PLCY 2460
Problem Set #1
Summer 2017
Due MONDAY 6/19/2017, by 9am

Last Name: Sarcone

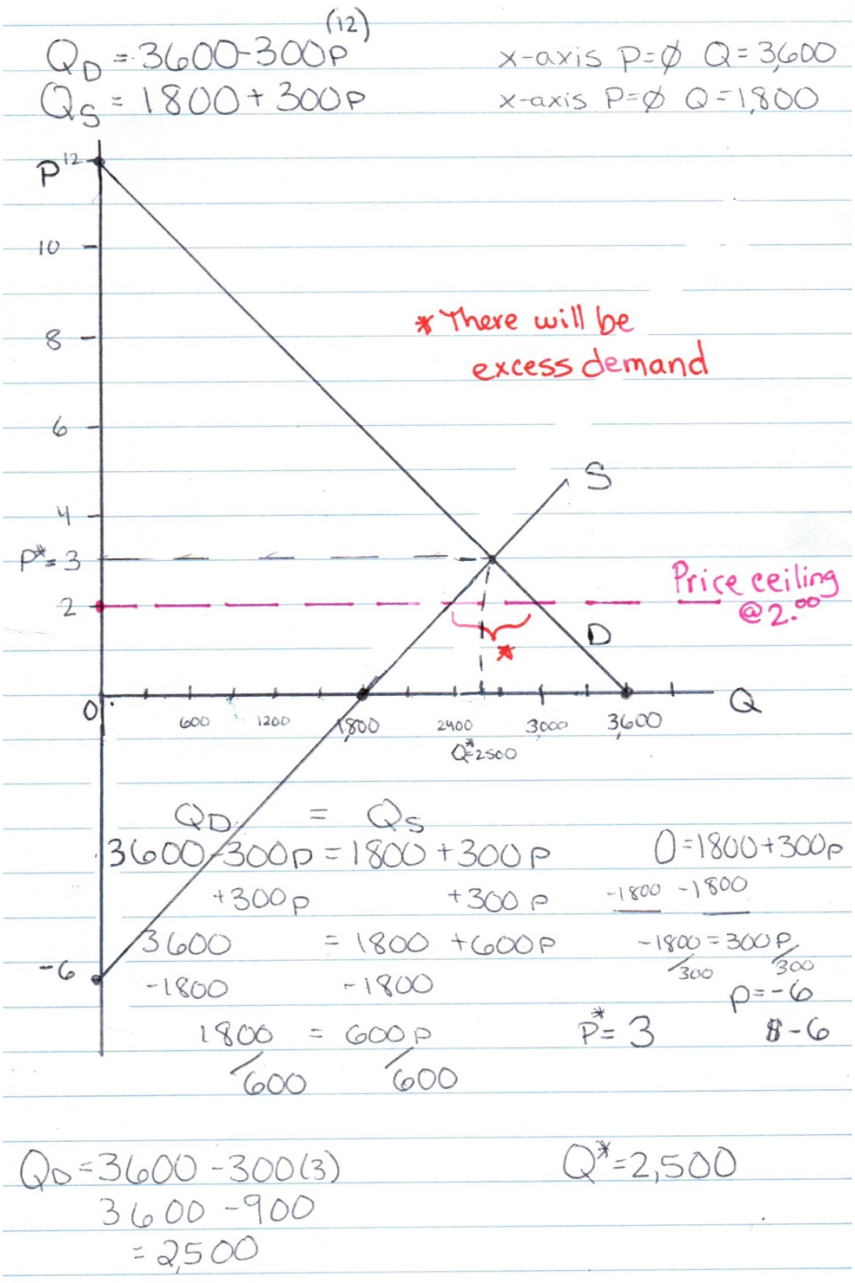
First Name: Krystal

Group members with whom you worked:

Chris Musick (on #8)

1. Annual demand for US wheat is: $Q_D = 3600 - 300P$
   Annual supply of U.S. wheat is: $Q_S = 1800 + 300P$
   P is the price, in dollars.

   a. Draw a supply and demand diagram representing this system.



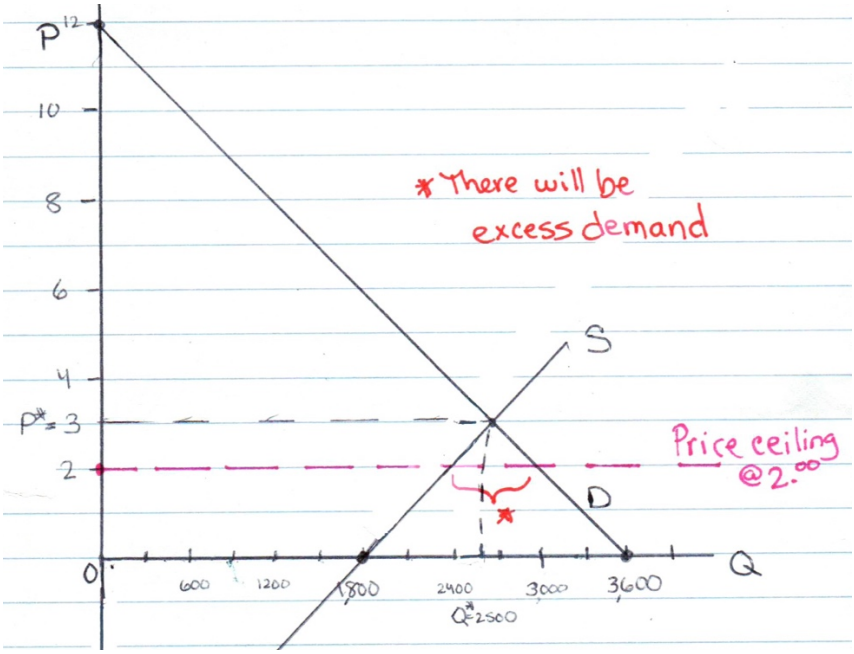
   b. What is the price for wheat in equilibrium? **$3.00**

   c. Government sometimes regulates the price of food. Imagine that government introduces a short-term restriction that you cannot sell wheat

at more than $2 per unit. What will happen to the market?

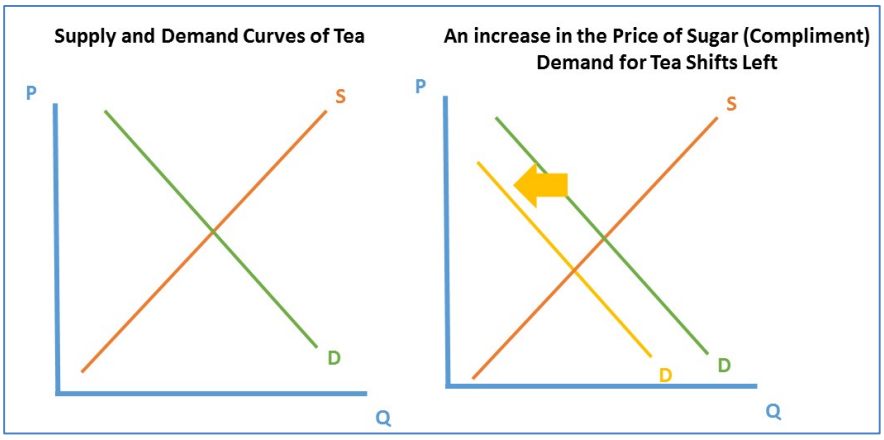
There will be excess demand.

Illustrate using your supply and demand graph.

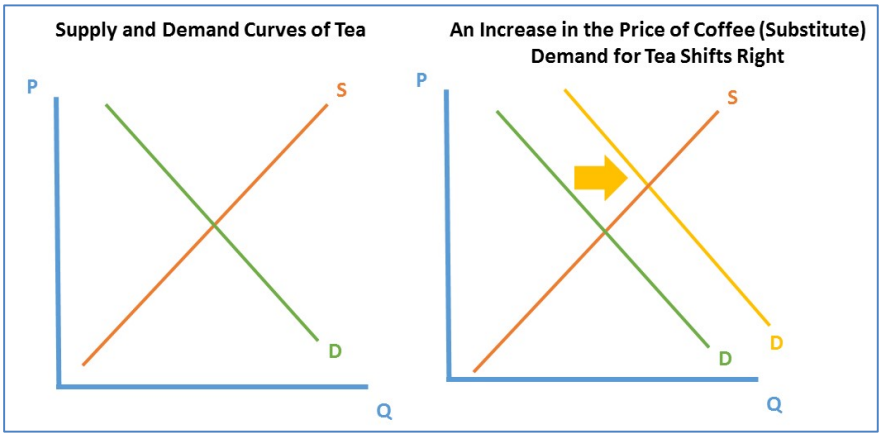


2. Use supply and demand curves to illustrate the effects of the following actions on the quantity and price of tea:

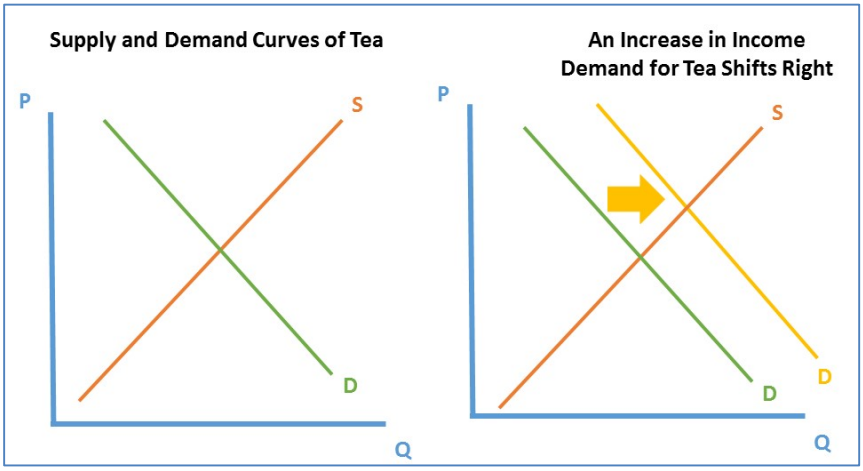
   a. An increase in the price of sugar. **Demand shifts in/left.**



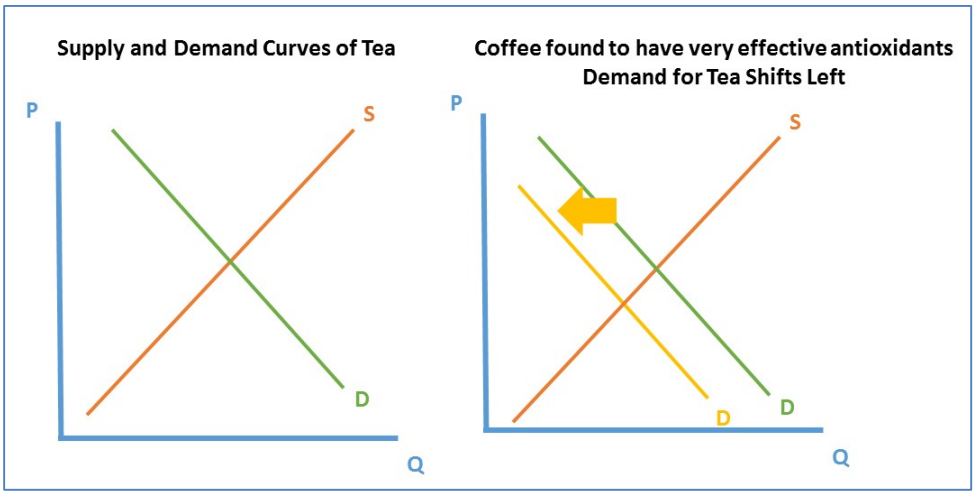
b. An increase in the price of coffee. **Demand shifts out/right.**



c. An increase in income levels. **Demand shifts in/left.**



d. An announcement from scientists that coffee contains very effective antioxidants.



3. TRUE, FALSE or UNCERTAIN (explain your answers):
    a. The elasticity of demand is the same as the slope of the demand curve.

       FALSE. Slope considers absolute unit changes whereas elasticity of demand considers relative changes. The slope represents "rise over run" and essentially is calculated by a change in the variable on the y-axis over the change over the x-axis. While, elasticity quantifies responsiveness of demand and supply to changes such as price. Elasticity answers, "how much does the demand change in response to changes in price?"

    a. The supply of apartments is more inelastic in the short run than in the long run.

       TRUE. In general supply is thought to be more elastic in the long run than in the short run.

    b. Demand for Dell computers is less elastic than demand for all desktop computers.

       FALSE. Demand tends to be more elastic for more specific goods. Thus, demand is more elastic for Dell computers vs. all desktop computers.

4. The rent control agency of Providence has found that the aggregate demand for apartments, measured in tens of thousands of apartments, is

   $Q_D = 160-8P$

   Price, which is the monthly rental rate, is measured in hundreds of dollars. The supply of apartments, in the same units, is: $Q_S = 70+7P$

ProbSet1: Econ #4

$Q_D = 160 - 8P$ When $P = \emptyset$ (x-axis) / $Q_D = 160$

$Q_S = 70 + 7P$ When $P = \emptyset$ (x axis) / $Q_S = 70$

$Q_D = Q_S$

$160 - 8P = 70 + 7P$

$+8P \quad +8P$

$160 = 70 + 15P$

$-70 \quad -70$

$90 = 15P$

$15 \quad 15$

$6 = P^*$ @ M.E.

$Q_S = 70 + 7(6)$

$70 + 42$

$Q^* = 112$

$Q_D = \emptyset$ when $P_D = 20$

$P_D = 20$

$Q_S = \emptyset$ when $P_S = -10$

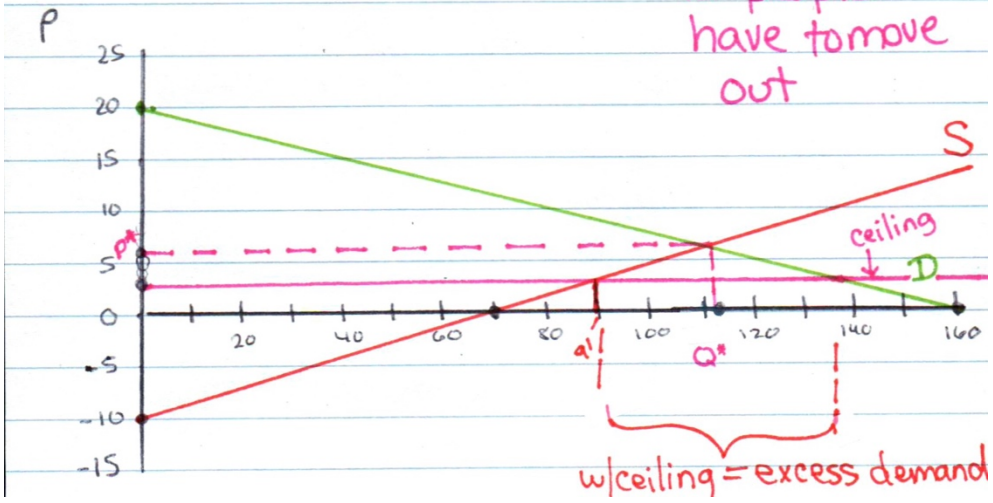
P: axis: -10, +20 (6)

Q: axis: 70, 160 (112)

2 people per apt. @ Equilibrium $P^* = 6$ $Q^* = 112 = 224$ pe

w/ ceiling @ P=3 S = 70+7(3) = 91 = 182

42 people have to move out



a. What is the free market price of apartments?

Market reaches equilibrium at $600

How much will population change (assume two people per apartment) if the rent control agency sets a maximum average monthly rent of $300 and everyone who can't find an apartment leaves the city?

420,000 people would have to move out of the city if there is rent control at $300

b. What would you actually expect to happen in this case? Would everyone leave the city? What if this example was in New York: do you think the effects of rent control would be the same or different in the two places? Why? (1-2 paragraphs).

Assuming people would move out of the city if rent were to be capped at $300 and the supply of apartments would decrease, leaving nearly 19% of the city without housing makes assumes that changes happen pretty instantaneously.

There's a temporal factor, is this price ceiling intended to be long term? Also landlords are not going to be able to see apartments so wouldn't you think they'd want some rental income verses none. Would people find their way around this. Are people able to find housing in a nearby city? What discretionary income do the people leaving the city have? For those working, is moving feasible?

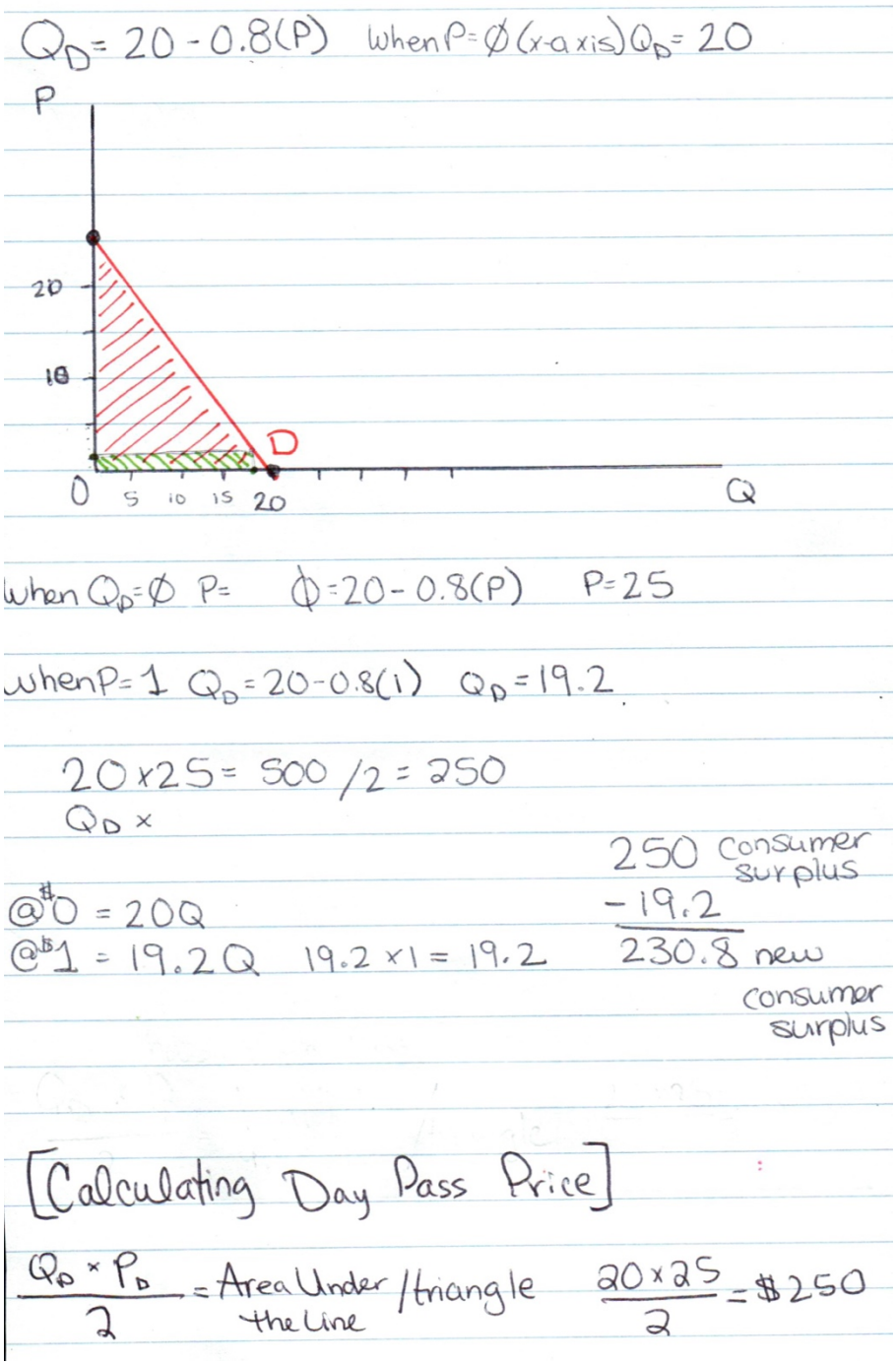
5. Disney World is trying to decide how to set the pricing for its rides. Suppose that it can operate rides costlessly, regardless of how many people take the rides. Everyone who visits the park has a daily demand for rides given by the following equation:
$q_D = 20 - 0.8P$

a. Suppose rides are free. How many rides will each person take in a given day?

If rides are free and P = 0, Q_D = 20, people will take 20 rides

b. How much will consumer surplus fall if the price per ride is increased from $0 to $1?

The consumer surplus drops 19.2 with an increase price per ride from $0 to $1



c. An alternative pricing regime is to sell a daily pass and let people ride all the rides for free. What is the most Disney could charge for the daily pass? **$250**

6. Researchers have estimated the long run demand elasticity for almonds is -0.47, and the long run supply elasticity is 12.0. The short run demand elasticity for almonds is -0.30, and the short run supply elasticity is 0.5. The government is considering a tax on almonds. What share will be paid by the consumer in the long run? How about the short run? Provide some intuition for why these are different.

Elasticity of Almonds

	Long Run	Short Run
Demand	-0.47	-0.30
Supply	12.0	0.5

Long Run % of tax burden on consumer = $\frac{E_S}{|E_D|+E_S} = \frac{12}{|-0.47|+12} = 0.9623$

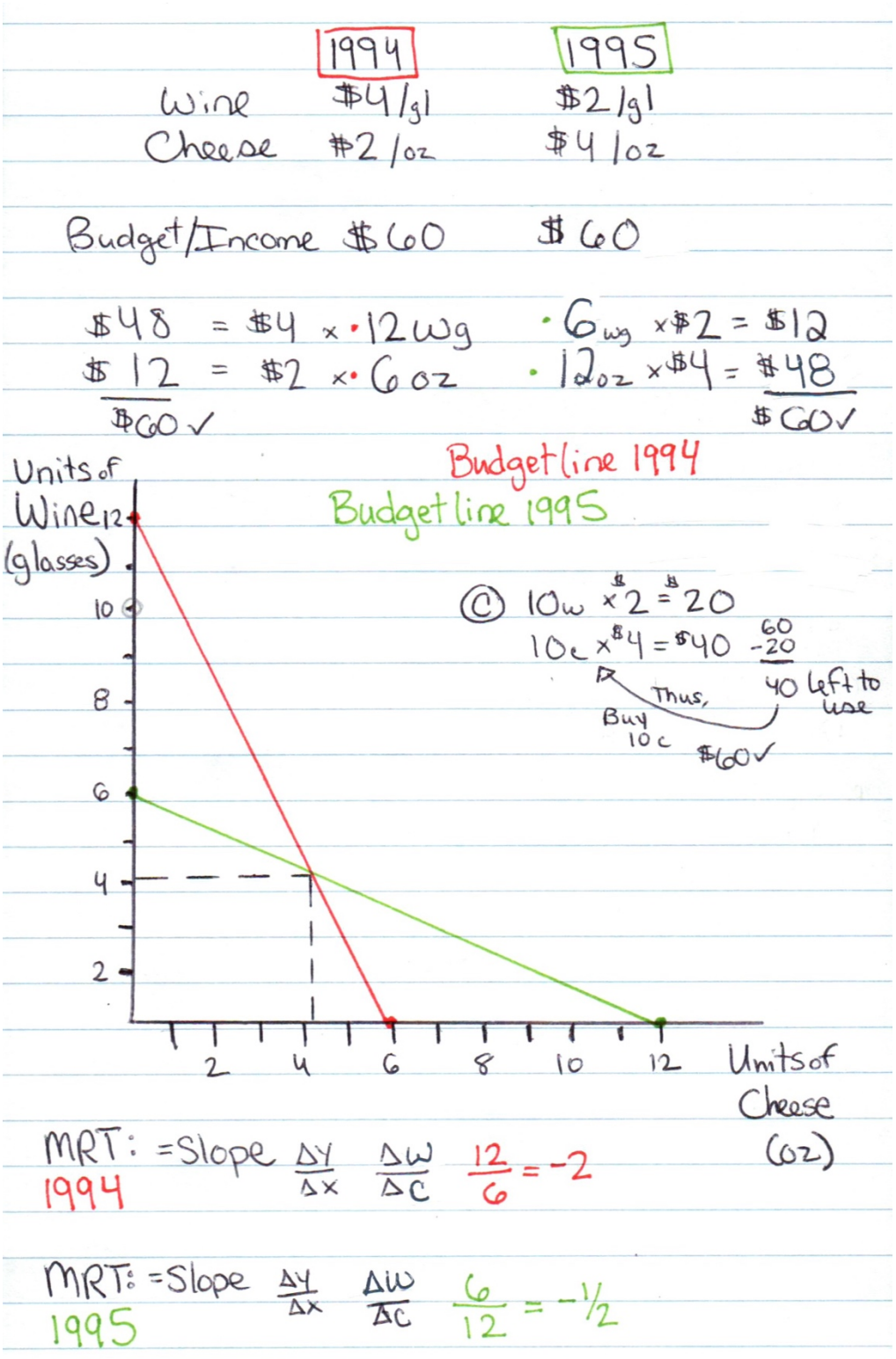
Short Run % of tax burden on consumer = $\frac{E_S}{|E_D|+E_S} = \frac{0.5}{|-0.30|+0.5} = 0.625$

In general the elasticity of supply is thought to be more elastic in the long run than in the short run because with given time, producers can adjust production and costs. Changing the number of almond trees you plant can't happen instantaneously, but doing so could help the elasticity of supply in the long run. This matches the data above in which elasticity of supply is 0.5 in the short term and 12.0 in the long run. If a producer is more elastic in the long run, they can shift the costs to the consumer. In the short run they must assume more tax burden as they are unable to adjust production and supply costs.

7. Louis has stable preferences and consumes two goods, wine and cheese. In 1994, the price of wine was $4/glass and the price of cheese was $2/ounce. Louis's income was $60 and he bought 12 glasses of wine and 6 ounces of cheese. In 1995, wine costs $2/glass and cheese costs $4/ounce. Louis's income is still $60.

    a. Draw both years' budget lines. Where do they cross?

    They cross at (4, 4)



b. What is Louis's marginal rate of substitution of wine for cheese in 1994?

MRT in 1994 = -2.0

c. True or false. Explain carefully. In 1995, Louis will definitely not buy exactly 10 glasses of wine.

False. Wine and cheese do not gave Louis the same utility, this is evident because he buys twice as much wine units than chocolate units even though it costs twice as much in 1994. Thus, in 1995 he wouldn't just buy 10 units of wine because that would mean with the remaining $40 of his budget, he would then buy 10 units of chocolate to maximize the budget, but that would imply he values them the same, which is not true. The MRT in 1994 is -2.0 and in 1995, the MRT is -0.5

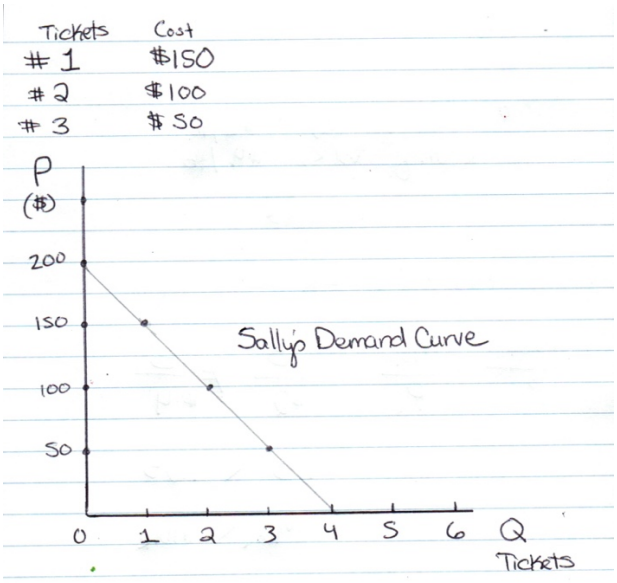
8. Tickets to a PawSox game are sold out and available only on a black-market basis. Sally and Mike are big PawSox fans and work together at a local bar. Mike tells Sally that he will go buy some tickets and asks her how many she wants.

   Sally replies: "If the price per ticket is $150, buy one ticket for me. If the price per ticket is $100, buy two tickets for me. And, if the price per ticket is $50, buy three tickets for me."

   Mike responds: "What are you talking about? You're saying you're willing to pay more in total for two tickets than for three. You are behaving irrationally."

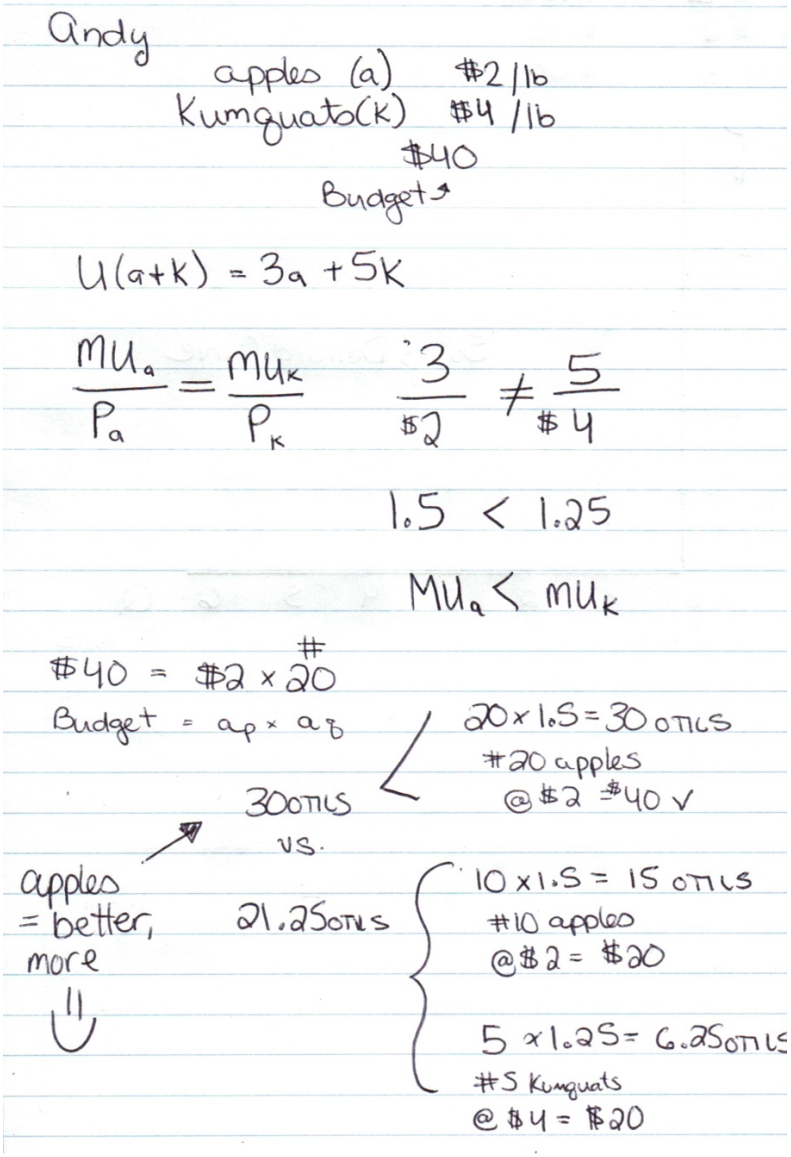
   Evaluate Mike's statement. Is Sally behaving irrationally?

   Sally's reasoning IS rationale because she's deriving less value from each additional ticket and also matches a typical demand curve.



9. Andy purchases only two goods, apples (a) and kumquats (k). He has an income of $40 and can buy apples at $2 per pound and kumquats at $4 per pound. His utility function is U(a,k)= 3a + 5k.

   a. What is his marginal utility for apples and his marginal utility for kumquats?
   MU(a) = 1.5 **MU(k) = 1.25**



   b. What bundle of apples and kumquats should he purchase to maximize his utility?

   Because apples provide higher utility, Andy should maximize his budget of $40 by buying only apples. Buying any kumquats would decrease his potential max utility.

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Problem Set #2
Summer 2017
Due MONDAY 6/26/2017, by 9am

Last Name: Sarcone

First Name: Krystal

Group members with whom you worked:

Damian Jovanovic (#5)

Cassie Taylor

1. What is the opportunity cost of your time per hour? Provide a detailed defense of your answer which makes clear that you understand the concept of opportunity cost and how to apply it. Approximately 3 paragraphs. You will be graded on the quality of your writing and argument in addition to your economic reasoning.

Opportunity cost can be conceptualized as best alternatives or foregone earnings or opportunities that produce income in some form or another. Opportunity costs are individual as each person has different aptitudes, assets and forgone experience or feasible alternatives.

As a MPA student with five years of work experience in non-profit management in a leadership role and with already having a master's degree my opportunity costs are noticeably different when compared to someone with no other higher education degree with little to no work experience.

Prior to starting my MPH (Masters of Public Health) I was earning $80,000/year as an executive director of a nonprofit. Within the past year I was offered an opportunity to run a medical practice in California, at which firm I would not work for less than $80k/annually. Instead I chose to pursue my MPA degree.

And though I have started a small side business in the last year and have complicated finances with investors, my own investment and foregone opportunities with regards to that scenario, for the sake of this assignment I will only be considering foregone wages from "best alternative" employment at the medical practice in California. This is because the possible foregone earnings from my small side-business, when considering time lost to working on the business while working at the medical center, is likely comparable to the time lost to working on the business while in school.

Lastly, I have not spent any savings on my tuition payment and so do not need to concern myself with calculating opportunity costs related to foregone interests.

I also consult for doctors currently and do not work for less than $35/hour and so know that at the very least my opportunity cost is at least that because theoretically I could just do that with all of my MPA time. However if I consider my "better" alternative of running a medical practice at a salary of at least $80,000 and would be working full-time $80,000 divided by 52 weeks = approximately $1,538/week then divided by 40 hours a week my opportunity cost per hour would be approximately $38.46 per hour.

2. The cost to United Airlines of flying a single plane from Chicago to New York is given by:

   C=50,000+10q

   where "q" is the number of passengers on the plane. Each plane holds up to 240 people. United flies this route 4 times per day (7am, 10am, 1pm and 4pm). The 7am and 4pm flights are always full, but the 10am and 1pm flights are only half full.

   a. Calculate the average cost per passenger for the full flights and for the half full flights.

      C=50,000+10q

      <u>Full Flights</u>: Average costs per passenger

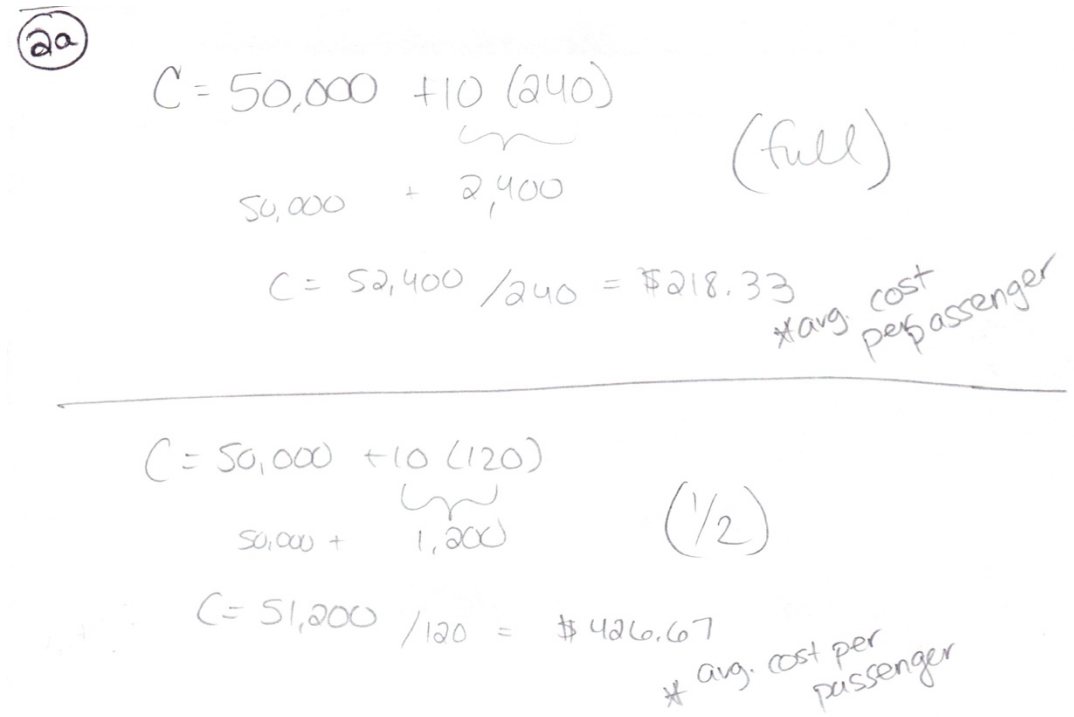
      C = 50,000 + 10 (240)
      C = 50,000 + 2,400
      C = 52,400 / 240 passengers = $218.33

      $218.33 average cost per passenger for full flights.

      <u>Half Flights</u>: Average costs per passenger

      C = 50,000 + 10 (120)
      C = 50,000 + 1,200
      C = 51,200 / 120 passengers = $426.67

      $426.67 average cost per passenger for half flights.



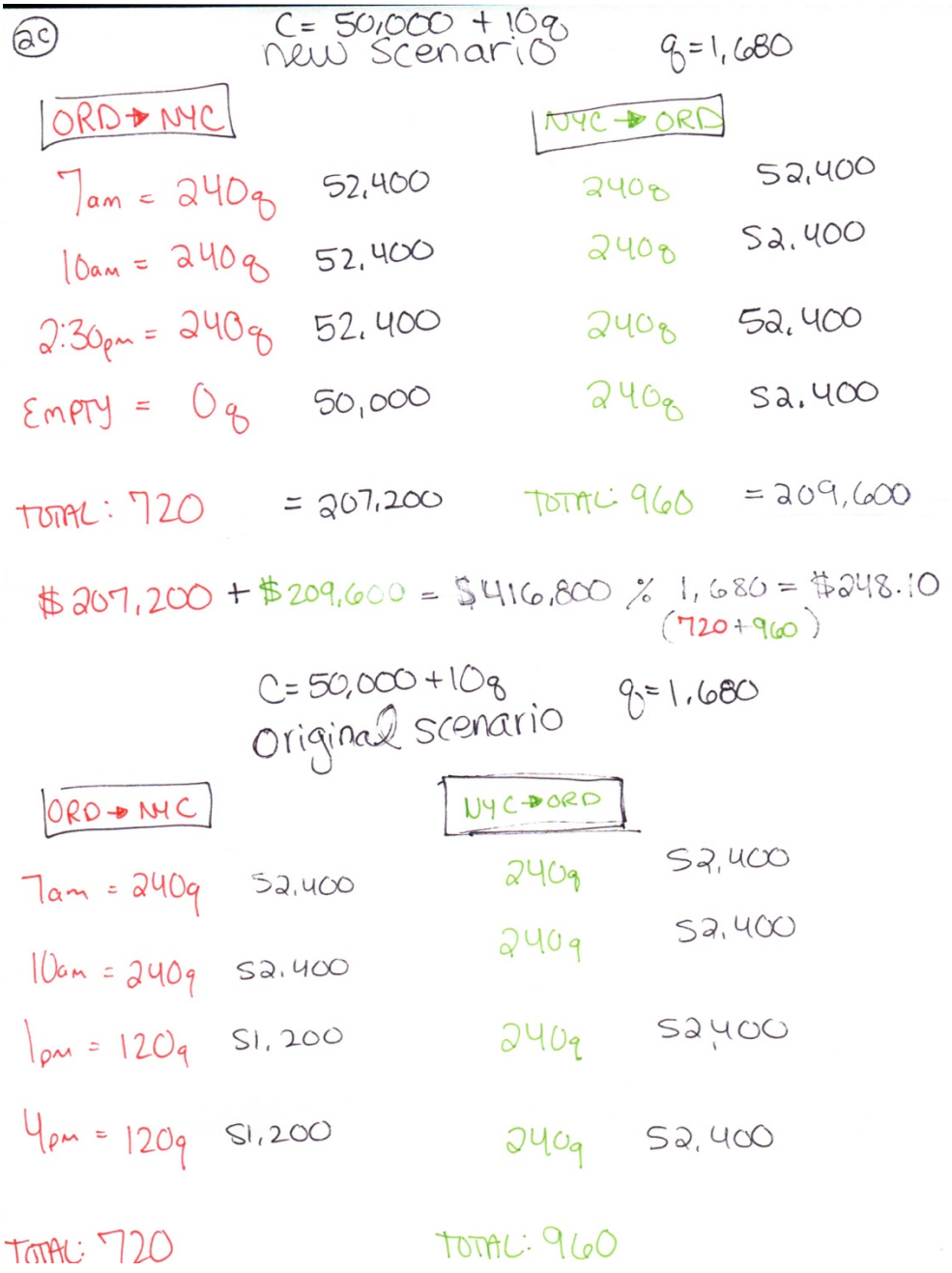
b. The airline hires you as a marketing consultant, and they would like to know whether they should focus on attracting people to the off-peak or on-peak flights. What is your advice?

My advice is yes- it is wise to indeed focus on attracting people to the off-peak flights as the average cost per passenger is approximately $208.34 more than for full flights ($426.67 - $218.33). As the flight gets more full, and q increases the average cost per person is going to decrease and since the fixed cost of flying this route is 50,000 and the variable cost is so little $10 per passenger it is wise to try to fill these flights.

c. You suggest to United that they might want to fly only *one* flight in the middle of the day, so it would be full. United says this is crazy, however, since they fly all four of these planes *back* to Chicago from New York, and when they fly back they are full on all four trips. Assuming you need to fly all of these four flights back from New York, and would therefore need to fly one empty plane from Chicago under your new suggestion, calculate the cost per passenger for a day of flying under your new scheme versus the current system. Which is better?

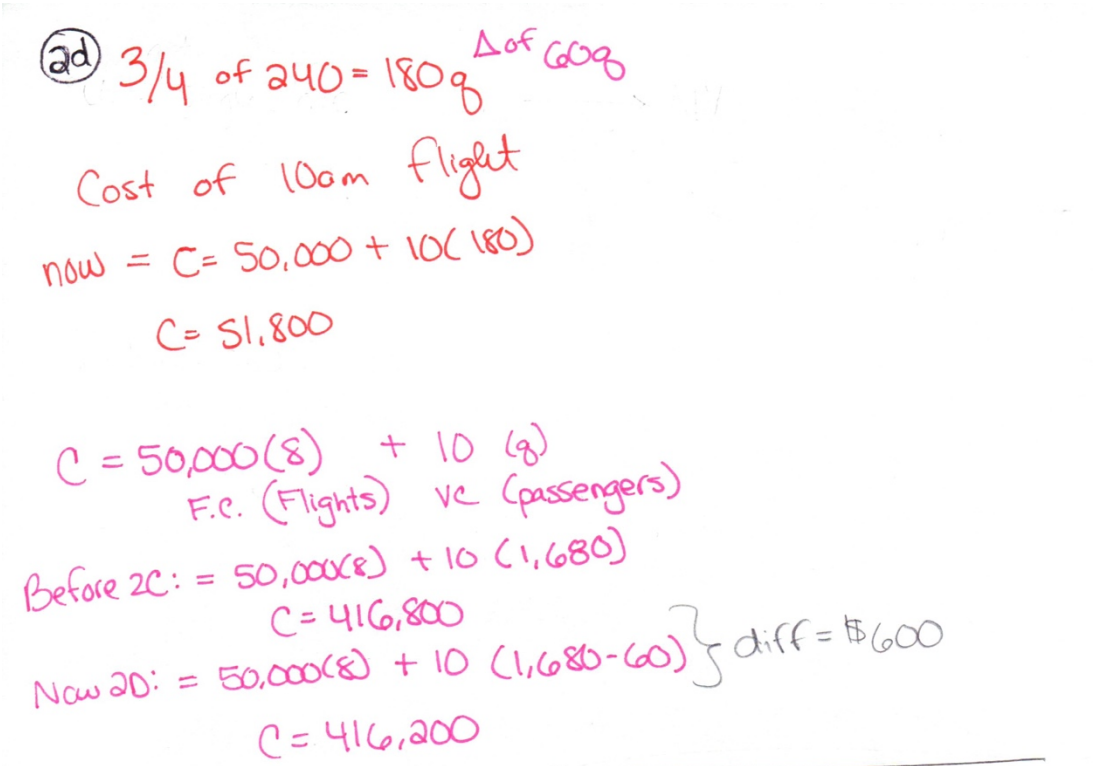
Neither is better in a financial sense. If eliminating an afternoon outgoing flight from ORD (Chicago) truly results in a full flight rather

than two half flights the end result costs the firm the same amount. This is because the cost function remains the same as C = 50,000 + 10q. In the end, you will still have 1,680 passengers daily and $400,000 in fixed costs to fly all eight flights and the average cost per passenger per day is about $248.10



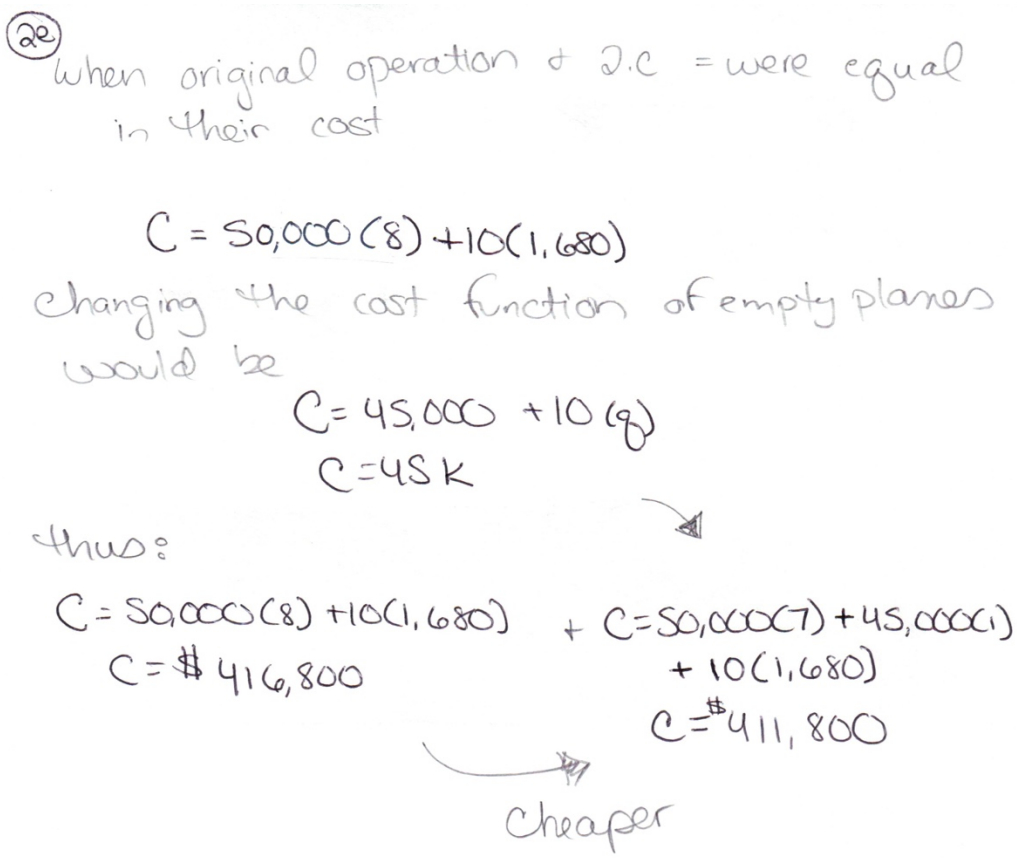
d. How would your response to part (c) change if United told you that sometimes the 10am flight from Chicago is 3/4 full?

If the flight from Chicago is "sometimes" 3/4ths full vs. totally full, then my advice stays the same. The change in the 10am flight doesn't impact the consideration for whether to combine p.m. flights out of ORD. However, it should be noted that on days when 10am flights are 75% full there will be a change in 60 q/passengers and a difference in $600 of costs on those days. In this scenario, the average cost per person, on days with 3/4th flights instead of full flights for the 10am is $256.91



e. Now suppose cost function differed depending on whether there are any passengers on plane at all. Specifically, assume instead that it only costs 45000 to fly an empty plane from Chicago to New York because you now no longer need any cabin crew. This reduces fixed cost by 5000. How might this change answer to part (c)?

Now changing the cost function of empty planes, does impact advice and decisions made related to part (c) because the option to offer three outgoing flights from ORD to NYC becomes a more fiscally responsible choice as we've decreased our fixed cost by $5,000. In this scenario the average cost per passenger is $245.12



3. The Providence Novelty company produces two different Halloween costumes, using the same assembly line. The skeleton requires 1 hour of assembly line time and $2 of material. The ghost costume require one-half hour of assembly line time and $3 of material. Assembly line time costs $10/hour. The Novelty Company is run by a former microeconomics student so is run according to the best economic principles. If the company is producing both costumes on the line this holiday season, what does that tell you about the price of ghost versus skeleton costumes?

   Since both Halloween costumes use the same production process and assembly line we have to assume they are making more of a profit off of skeletons because if they weren't they'd just produce more ghosts. We assume that with the best economic principles in mind, we'd set our profits functions equal to each other to optimize production and profits. And so though skeletons cost more to make we assume they are charging more (the market price is higher) and they are making more (profit) and demand is adequate is to do so since an economic student is making optimal smart decisions.

(3) Assembly = $10/hr $5/30min

Sk	Gh	
1hr = $10	0.5hr = $5	machine hours
$2 mat.	$3 mat.	materials

cost/hr

$2 + $10 = $12

$3 + $5 (30mn)
$6 + $10 (60min) (2q)
$16

$MC_a(q_a) = MC_b(q_b)$

Cost per q = $12 Skeletons

Cost per q = $8 Ghosts

* we're assuming they are making more of a marginal profit b/c otherwise we'd make

$\pi = P \cdot q - C \cdot q$ $\pi = P \cdot q - C \cdot q$

$P_s \cdot q - C \cdot q = P_g \cdot q - C \cdot q$

$P_s \cdot q - \$12(q) = P_g(q) - \$8(q)$

$P_s(10) - \$12(10) = P_g(10) - \$8(10)$

$\$12(10) - \$120 = \$8(10) - \$80$

Produce same(q) → can charge more for skeletons. * skeletons are more in demand

* we make more off of skeletons which produce of offsets its higher cost to

4. An axe producer owns plants in Illinois and New Mexico. The plant in New Mexico is slightly newer and produces any given number of axes at a lower cost than the plant in Illinois.

Specifically, the cost functions for each of the two plants can be approximated by the following two equations:

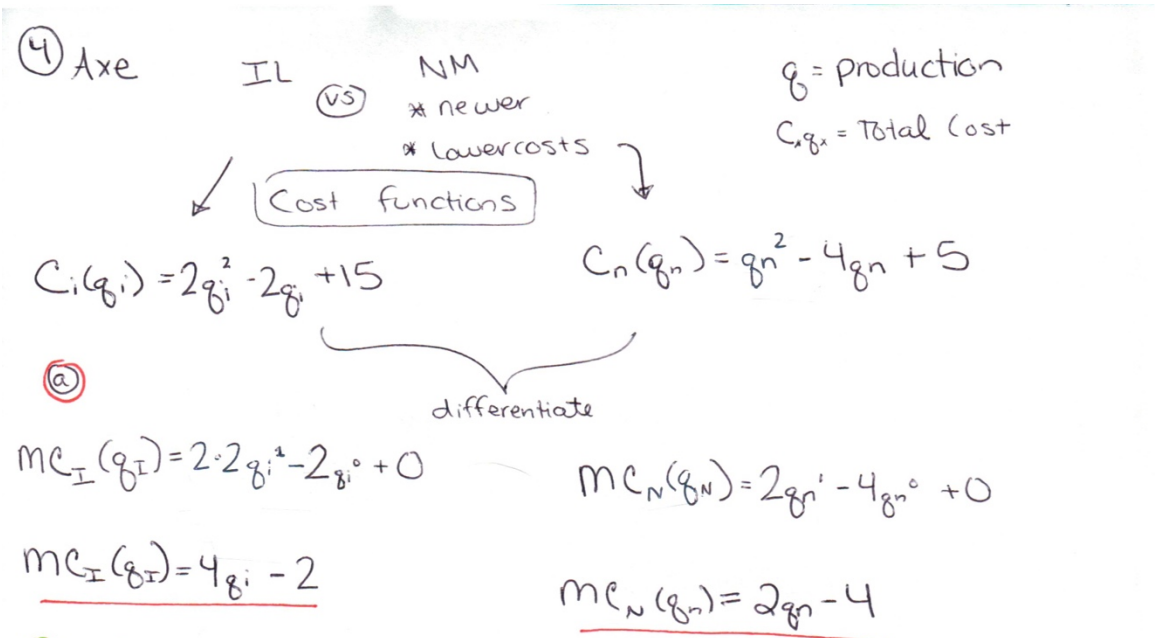
$C_I(q_I) = 2q_I^2 - 2q_I + 15$
$C_N(q_N) = q_N^2 - 4q_N + 15$

where q_I represent the total number of axes produced in the Illinois plant, q_N represent the total number of axes produced in the New Mexico plant, $C_I(q_I)$ represents the total cost to produce q_I axes in the Illinois plant, and $C_N)(q_N$ represents the total cost to produce q_N axes in the New Mexico plant.

a. What are the marginal cost functions for each of the two plants? Denote these functions $MC_I(q_I)$ and $MC_N(q_N)$.

$MC_I(q_I) = 4_{qi} - 2$

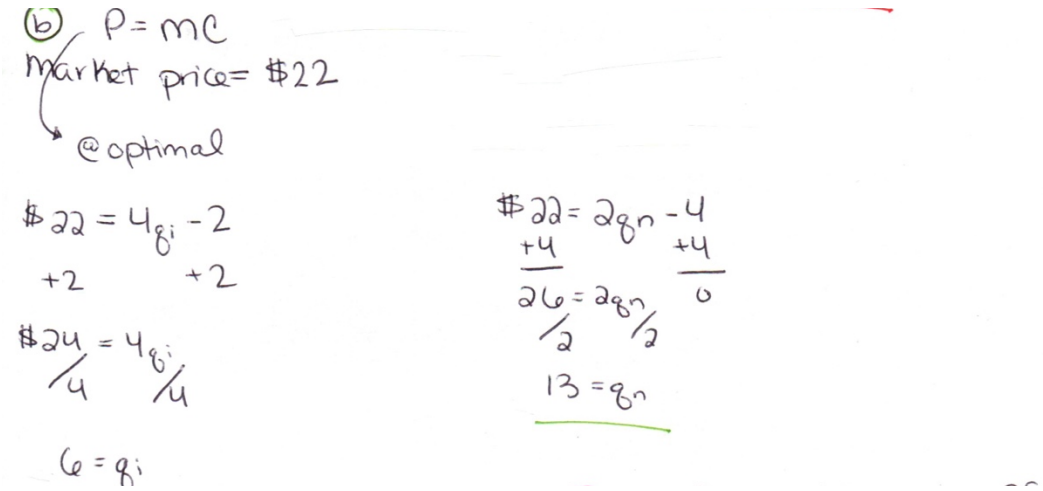
$MC_N(q_N) = 2_{qn} - 4$



b. If the market price for axes is $22, how many axes should the firm produce in each plant?

MC = P

Illinois = 6
New Mexico = 13

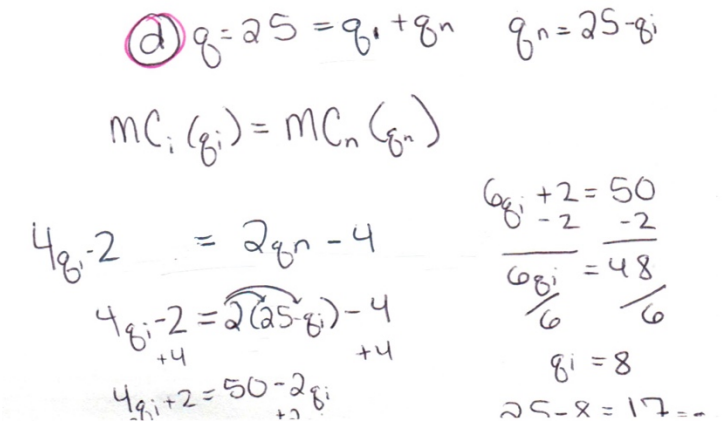


c. Explain in words why the firm should not produce more total axes than the amount you indicated in part (b) when the price for axes is $22.

You should not produce more than what is optimal for the market price of $22 because your marginal costs should equal price to maintain optimization. And so though IL is producing less, they are still producing turning a profit at the above rate. If marginal costs were greater than the market price of $22 then we'd be producing axes we could not sell and costing our firm money / negative dollars. When P < MC, you should produce less, which is why we would not produce more total axes than what was indicated in part (b). If either plant produced more, it would be inefficient and cost the firm money.

d. If the firm decides to produce 25 total axes, how many axes should it produce at the Illinois plant and how many should it produce at the New Mexico plant? [You should ignore transportation costs.]

Illinois = 8
New Mexico = 17



The bottom portion got cut off but qi = 8 and qn = 17

5. An eyeglasses manufacturer can produce eyeglasses according to the following production function:

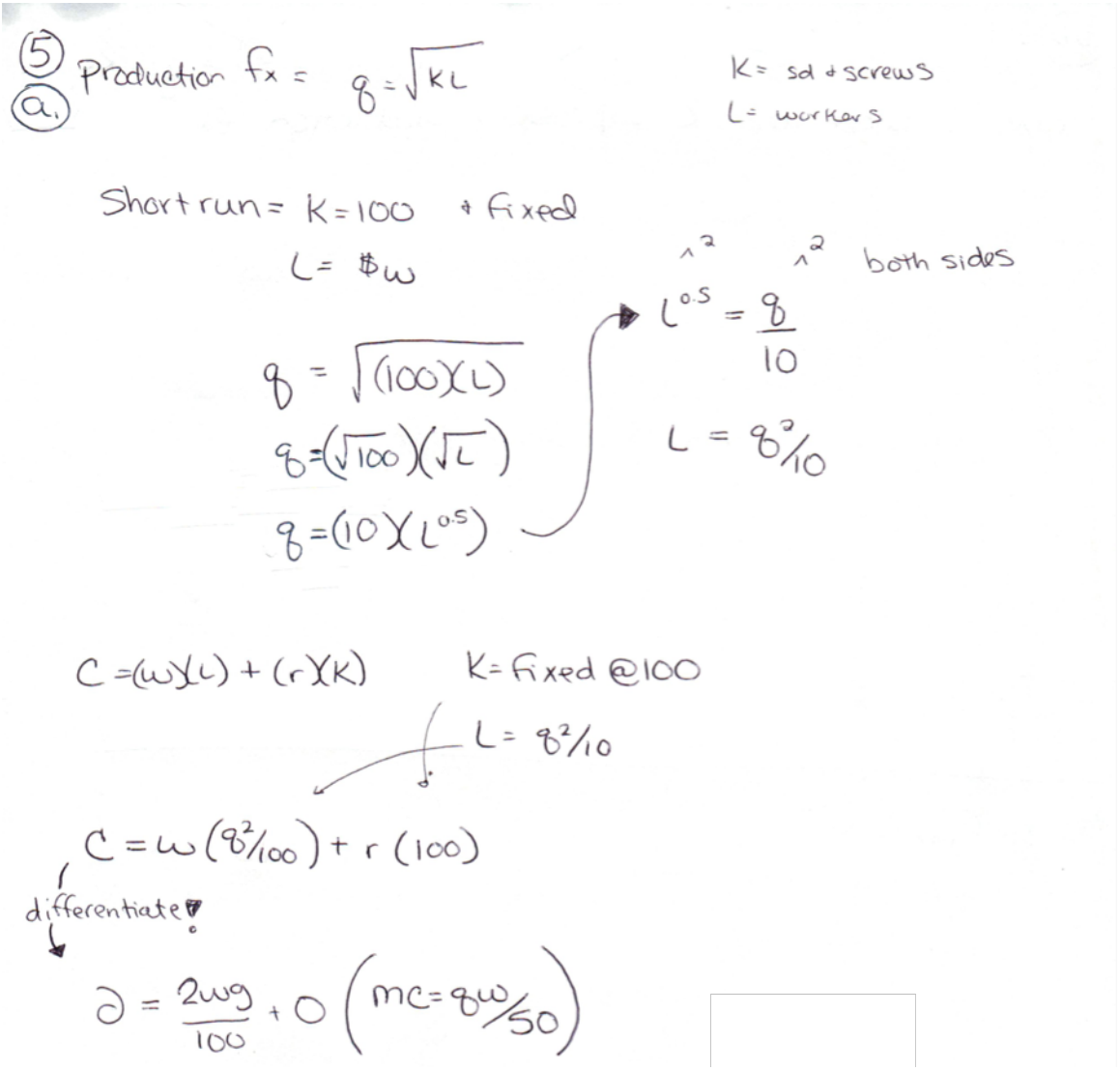
$$q = \sqrt{KL}$$

where K is the number of tiny screwdrivers and tiny screws the firm owns, and L is the number of workers the firm employs.

In the short run, the company cannot buy any more tiny screwdrivers or tiny screws (in other words, the capital stock is fixed).

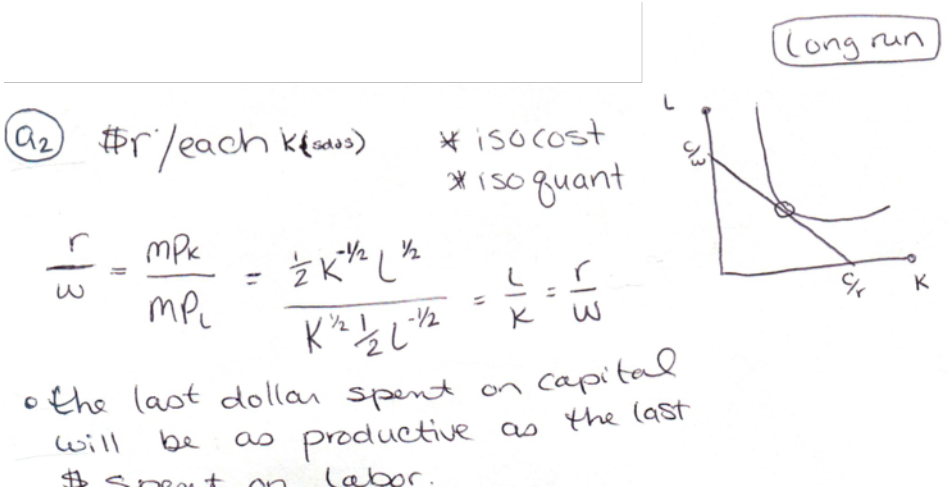
a. What is the short run marginal cost function for the firm if K is fixed at 100, and workers are paid a wage of $\$w$ each?

[Hint: Figure out how many workers the firm has to hire to make q eyeglasses when it owns 100 tiny screwdrivers and tiny screws. Then use that function to write the total cost function]



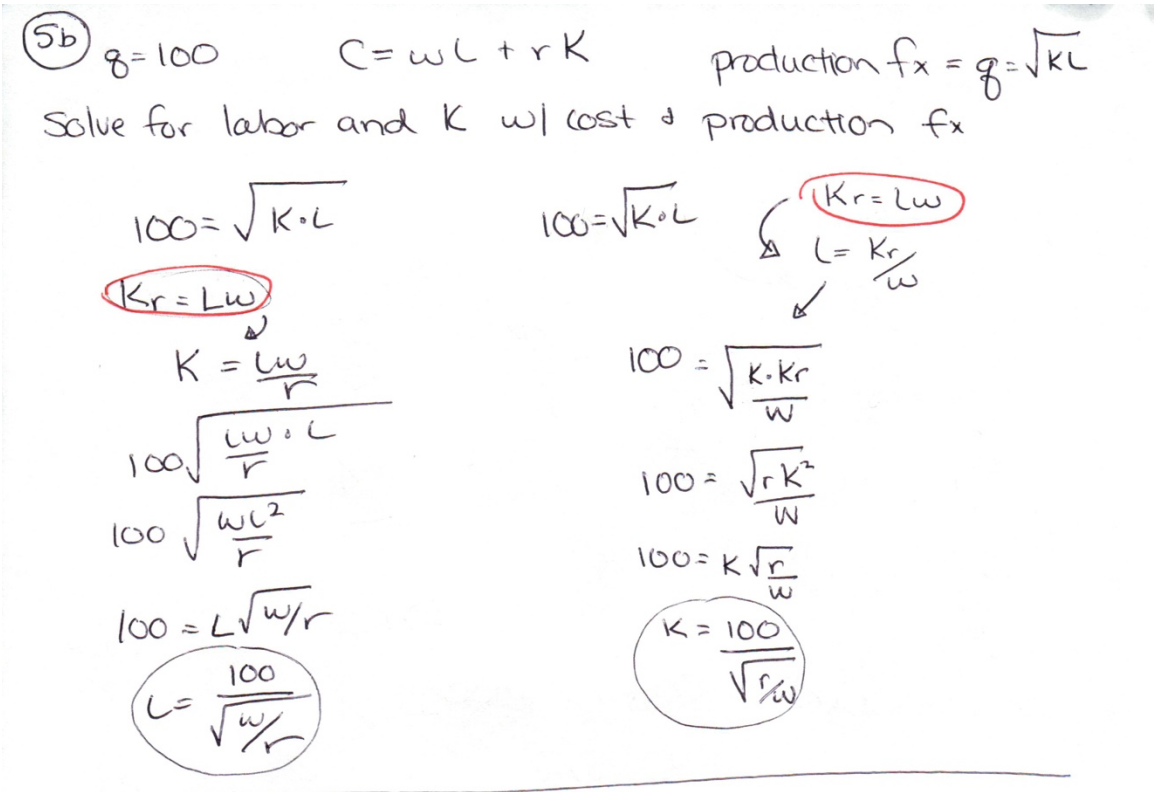
For the remainder of the problem, consider the long run. The firm can now buy as many tiny screwdrivers and tiny screws as it wants, at a price of $*r* each.

a. Solve for the tangency condition that determines the amount of *K* and *L* the firm will buy to produce a given amount of eyeglasses at minimum cost. [You should get an equation in terms of *K,L,w* and *r*.] Also, explain this condition in words.

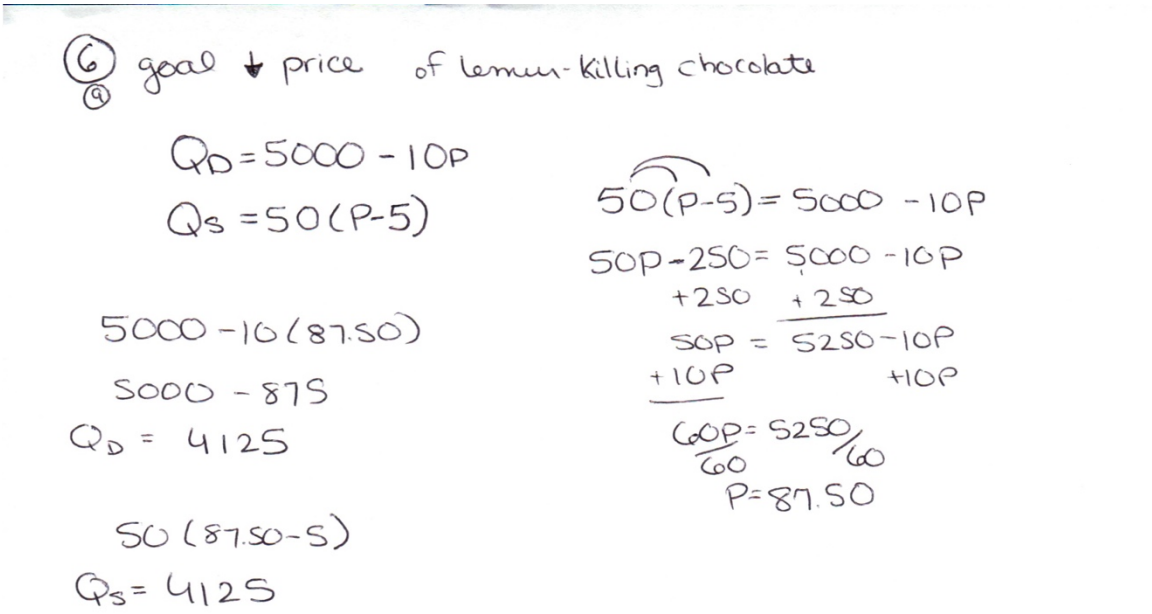


At tangency, when the slopes are equal, the last dollar spent on (K) capital is productive as the last dollar spent on labor.

b. How many tiny screwdrivers and tiny screws will the firm own, and how many workers will the firm employ if it decides to produce 100 eyeglasses at minimum cost?



6. It has recently been revealed that many cocoa bean growing operations infringe on the habitat of an endangered species of lemur. You are part of a group that would like to organize a boycott of lemur-damaging chocolate. Your goal is to decrease the price of lemur-killing chocolate and, therefore, punish the suppliers of it.
    a) In the current, pre-boycott, market you have the following demand and supply conditions: Q_D=5000-10P, Q_S=50(P-5), No quantity supplied at P<5. Solve for the market equilibrium.



Equilibrium is reached at Q = 4,125 & P = $87.50

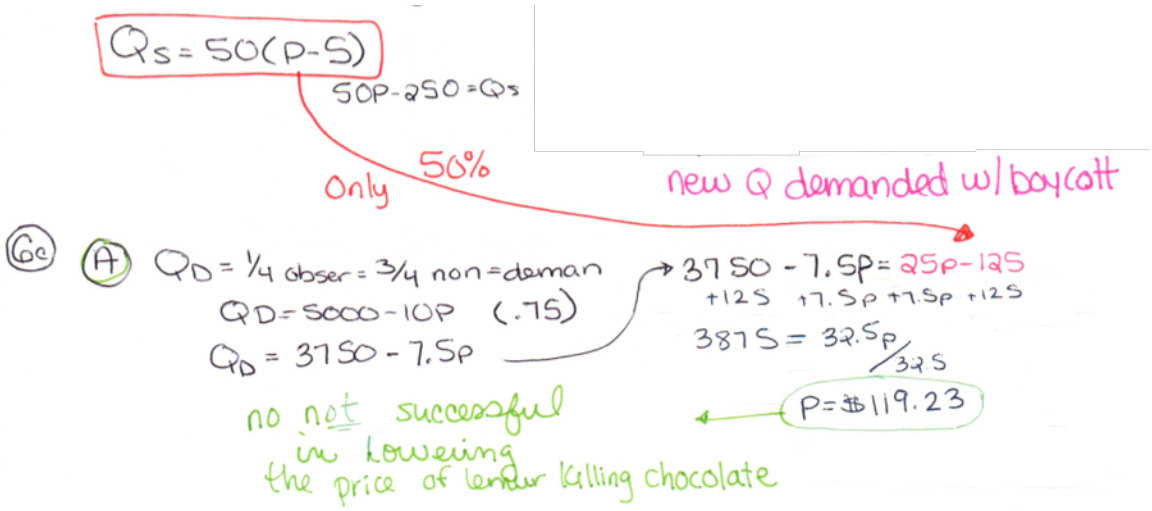
    b) The supplier market contains "target" firms – those who produce lemurkilling chocolate – and "non-target" firms, who produce lemur-friendly chocolate. The demand market contains two types of people: "observers" – who observe the boycott and will only buy lemur-friendly chocolate – and "non-observers" – who ignore the boycott and buy whatever is cheaper.

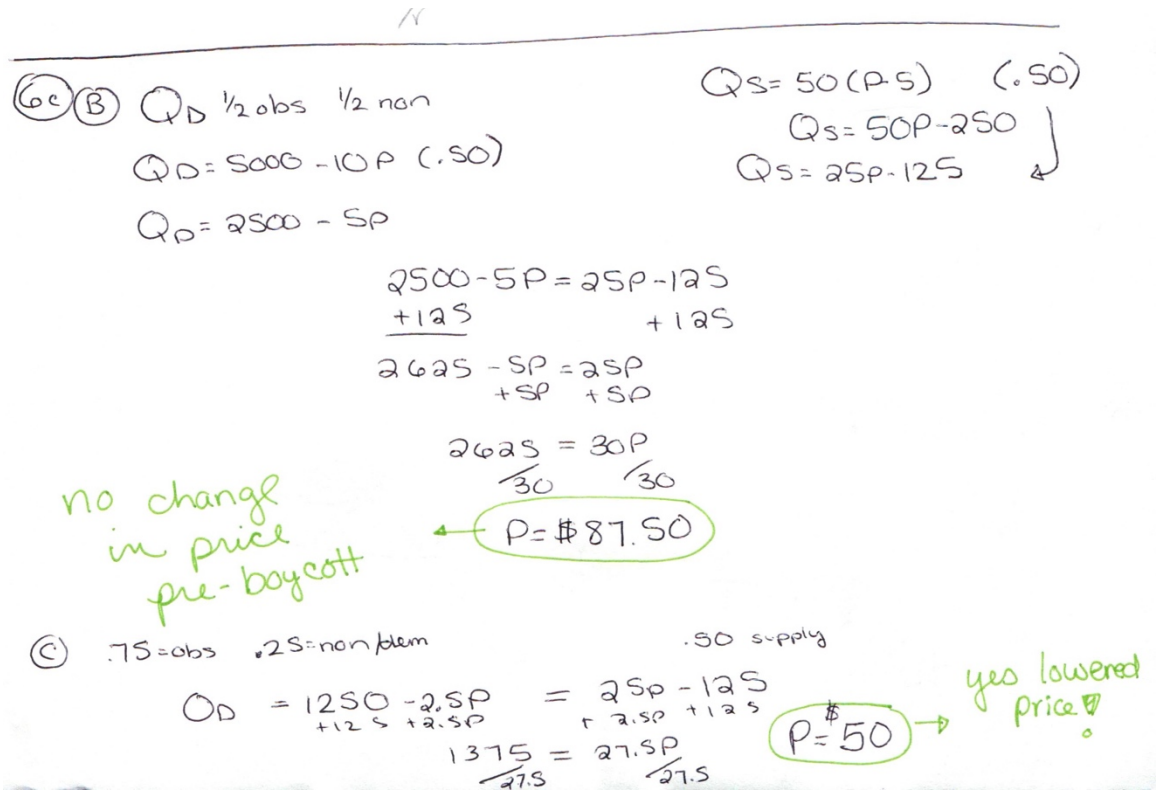
Suppose 50% of target firms are suppliers. Write the supply curve of these firms. Suppose 70% of people are observers. Write the demand curve facing the target suppliers.

c) Consider the following three situations:

Situation	Share of Observers	Share of Target Sellers
A	¼	½
B	½	½
C	¾	½

In each case, indicate whether the boycott will be effective in the sense of lowering the price paid to the target sellers. Comment on the intuitive reason for you findings.





As seen when assessing the demand and supply functions considering target sellers share in the supply of chocolate and the percentage/proportion of boycott participation, we see that with 25% observers the price of chocolate rises substantially. With 50% of observers there is no price change compared to pre-boycott costs and with 75% observers- there is eventually a $37.50 decrease in price. The only option that would be "effective" at reducing the price of non-lemur killing chocolate to motivate people to switch would be option C.

PLCY 2460

Problem Set #3
Summer 2017

Due MONDAY 7/3/2017, by 9am

Last Name: Sarcone

First Name: Krystal

Group members with whom you worked with;

Marisa Vang (# 2 & 6)

1. A good is produced by a constant-cost industry. Market demand for the good is:

$Q^D(P) = 85 - 3P$

The long-run total costs for each firm in the industry are given by:

Output	0	1	2	3	4	5	6	7	8
Total Cost	0	24	40	48	60	80	108	140	176

a. What is the long-run equilibrium price?

P = $15.00

See work in appendix

b. What is the quantity at each firm?

q = 4

See work in appendix

c. What is the long-run industry quantity?

Q = 40

See work in appendix

d. What is the number of firms in the long-run?

N = 10

See work in appendix

Now assume the government decides that only the firms currently in the industry should be allowed to compete in the industry. These firms receive licenses to produce the good. No other firms may enter the industry. By itself, the licensing does not change the long-run equilibrium in the industry. To illustrate the impacts of licensing, consider what happens if the demand curve shifts out to:

$Q^D(P) = 144 - 3P$

e. How high would price have to be to get each firm to produce 5 units? To produce 6 units? To produce 7 units?

@ 5q = $31.33
@ 6q = $28.00
@ 7q = $24.67

See work in appendix

f. Denote the three prices calculated in part (e) as p5, p6, and p7. One of these prices is the new market-clearing price. Which one? Why? [Don't forget that the number of firms is fixed]

The new market clearing price would be $28.00 because at that quantity of q=6 the MC = P

See work in appendix

2. There is a monopoly firm that faces the demand curve: P= 100(1-.01Q) and has a constant marginal cost of production equal to $20. Find the equilibrium price and output of this firm. What happens to equilibrium price, output, producer and

consumer surplus if the government offers this firm a $4 subsidy for every unit of output it produces?

The equilibrium price is $20 at a quantity of 80. With a $4 subsidy, the new equilibrium price will decrease to $16 and the new quantity will 84. Subsequently consumers experience an increase in consumer surplus. The producer also experiences an increase in surplus.

See work in appendix

3. A monopoly producer of widgets faces a demand curve:

   P = 100 - (Q/2)
   The monopolist's costs are:
   Cost = 10Q

   a. Consider first a perfectly competitive industry in which every producer has the same costs as the monopolist. What will the industry price and quantity be in the perfectly competitive case?

      P = 10 Q = 180

      See work in appendix

   b. Find the monopolist's choice of price and quantity.

      P = 55 Q = 90

      See work in appendix

   c. The government is concerned that the monopolist is not producing enough units of the good. The government is trying to figure out how much of a per-unit tax or per-unit subsidy it can place on the production of the good to induce the monopolist to produce the perfectly competitive quantity of the good. Figure out the monopolist's quantity as a function of *t*, the tax or subsidy. Figure out how much *t* should be (it could be negative) to induce the monopolist to produce the perfectly competitive quantity of the good.

      The subsidy would be – 90

      See work in appendix

4. One of the more important antitrust cases of the century involved the Aluminum Company of America (Alcoa) in 1945. At the time, Alcoa controlled 90% of the primary aluminum production in the US, and the company had been accused of monopolizing the market. In defense, they argued that although they controlled a large fraction of the primary market, secondary aluminum (i.e. produced from recycling scrap) accounted for 30% of total supply and many competitive firms were engaged in recycling. Therefore, they do not have much monopoly power.

    a. Provide a clear argument in favor of this position, drawing on what we have learned about monopoly.

    It should first be made aware that secondary aluminum is a close and comparable/adequate substitute for virgin/primary aluminum; this is the first premise upon which I refute the claims of monopolistic behavior on part of Alcoa. Further Alcoa doesn't meet the standards of being a monopoly in that they don't have complete control over product availability on part of the consumer. Though they control 90% of primary aluminum production, they encounter competition from not only the other 10% of primary aluminum producers, but also from secondary producers. Within the sphere of secondary production, Alcoa only accounts for about 30% and the non-negligible 70% of supply for secondary aluminum, gives light to the reality that other firms participate in this industry and essentially are allowed to enter and have measurable market share. Alcoa's true market share is notably reduced when considering total output and secondary supply.

    b. Provide a clear argument against this position, drawing on what we have learned about monopoly.

    Alcoa not only controls 90% of the primary production of aluminum in the US, but its claim that secondary producers of aluminum (through recycling) provide sufficient competition in efforts to dispute monopolistic claims is a meager argument. Despite the fact that Alcoa secondary aluminum production is only 30% of total supply within this market, the real leverage in the aluminum industry (primary and secondary) lies in the hands of Alcoa. The viability and vitality of competition (the ability to compete in supplying aluminum) more so resides in the secondary supply chain as Alcoa undoubtedly dominates in primary production; however the producers of secondary aluminum are <u>largely</u> dependent on the production of primary aluminum, which Alcoa dominates. This reality is paramount in

considering the true market share leverage Alcoa demands. Without Alcoa producing primary aluminum, secondary competition would barely exist and such should not be considered as true competition. Alcoa essentially controls not only 90% of primary production of aluminum but also indirectly secondary production.

c. Say you were running the case for Alcoa: what type of data/results would you try to bring to support your position?

I would bring in historical data and transactions on Alcoa activities. These would include any existing legal agreements with providers of related/necessary services or mechanisms such as hydropower. The dealings of Alcoa in the early 1900's reveal that not only were they gearing up for economic dominance, but they were able to claim market share through enacting contracts surrounding "exclusive rights." I would want to see market share growth and acquisitions. I would want specific data on closest competitors in primary and secondary aluminum production. I would like to see trends and timing of firms entering and exiting the aluminum market etc. I would like to see market value for primary verse secondary aluminum and if Alcoa was producing secondary aluminum just to present a subset of the industry in which they did not dominate, even though they were not fair comparisons. The truth is that virgin and secondary aluminum are not comparable as there is much less demand and utility with the latter, which certainly impacts profit and how generating a branch endeavor to disguise as competition is more a transparent ploy than reality of non-monopolistic business doings. I would also like to look specifically at the market equilibrium for non-Alcoa firms offering primary aluminum to better assess if Alcoa is more of a price taker or price maker.

5. At Café L'Artisan a large hot coffee is $2.00, but a large iced coffee is $2.50. My friend Katie (a psychologist) says she thinks this is due to price discrimination.

a. What is Katie's argument? What kind of price discrimination is this?

Katie's argument revolves around essentially selling a product variation- hot coffee with ice and it meets the criteria of 2nd degree price discrimination in which the buyers will self-sort by preference (ice vs. hot coffee). Price discrimination strives to capture surplus. Through charging different prices to different people, price discrimination does aid in capturing more surplus, and thus is

efficient. And second degree price discrimination specifically pertains to product variation as means by which price variations mirror. Because Café L'Artisan cannot charge everyone their individual willingness to pay (WTP) through having a magic ball to know such information Café L'Artisan cannot engage in 1st degree price discrimination and seems to choose not to engage in 3rd degree in which groups people by characterization, i.e. student or senior citizen.

See work in appendix

b. Do you agree that this seems like the likely reason? Is your answer affected by learning that there is a Starbucks across the street?

Though the above scenario seems to check the right boxes for price discrimination under the 2nd degree, involving self-sorting preferences, I am more inclined to think the pricing scheme is actually a hybrid decision factoring in two core concepts. The first of which does relate to price discrimination in which firms know that WTP is more inelastic for ice coffee buyers and that they are less price sensitive, but I also know that though it seems as though suppliers are offering comparable products, caffeinated beverages of similar size, the costs in producing the two similar products, hot and iced coffee, do in fact vary. I believe both factors play a role in charging more for ice coffee.

6. Hayley's Bistro is considering having an "early bird special", discounts for individuals who are willing to dine early.

One reason that a restaurant might consider such a plan is because the restaurant gets too full at peak times. Let's assume that Hayley **does not** have this problem; Hayley is considering the special purely as a price discrimination scheme. *Assume the costs of serving customers are constant throughout the day* and are equal to $10 per customer. This implies that overcrowding, turning people away, etc. are not problems, even at peak hours.
Hayley's Bistro serves two types of customers, senior citizens and young people. There are 100 customers of each type. Within each group, the consumers are identical. The total willingness to pay for dinner at Hayley's by each group is a function of the time of day. Each customer will only dine once per day.

	Seniors	Young People
Dinner at 6	$29	$46
Dinner at 7	$35	$58

a. Suppose that Hayley is forced to charge the same price for dinner at 6 as for dinner at 7. Hayley is also forced to charge the same price to Seniors

as to Young People. How much should Hayley charge? How much profit will Hayley earn?

Hayley should charge $35 and at that price she will make a profit of $5,000

See work in appendix

b. Would your answer in (a) change if it cost $20 to serve each customer?

Hayley should now charge $58 and at that price she will make a profit of $3,800

See work in appendix

c. Now suppose that Hayley can charge a "senior citizen price" and a regular price. Hayley can also charge different prices for dinner at 6 and for dinner at 7. What will the regular price be at 6? At 7? How much will the senior citizen price be at 6? At 7? How many people in total will dine at 6? At 7? What will Hayley's profits be?

Hayley should charge a regular price of $46.01 at 6pm and senior citizen discount at 6pm for $29.01 and at 7pm charge $58 for regular pricing and $35 for senior pricing. With this scheme she will make a profit of $7,300

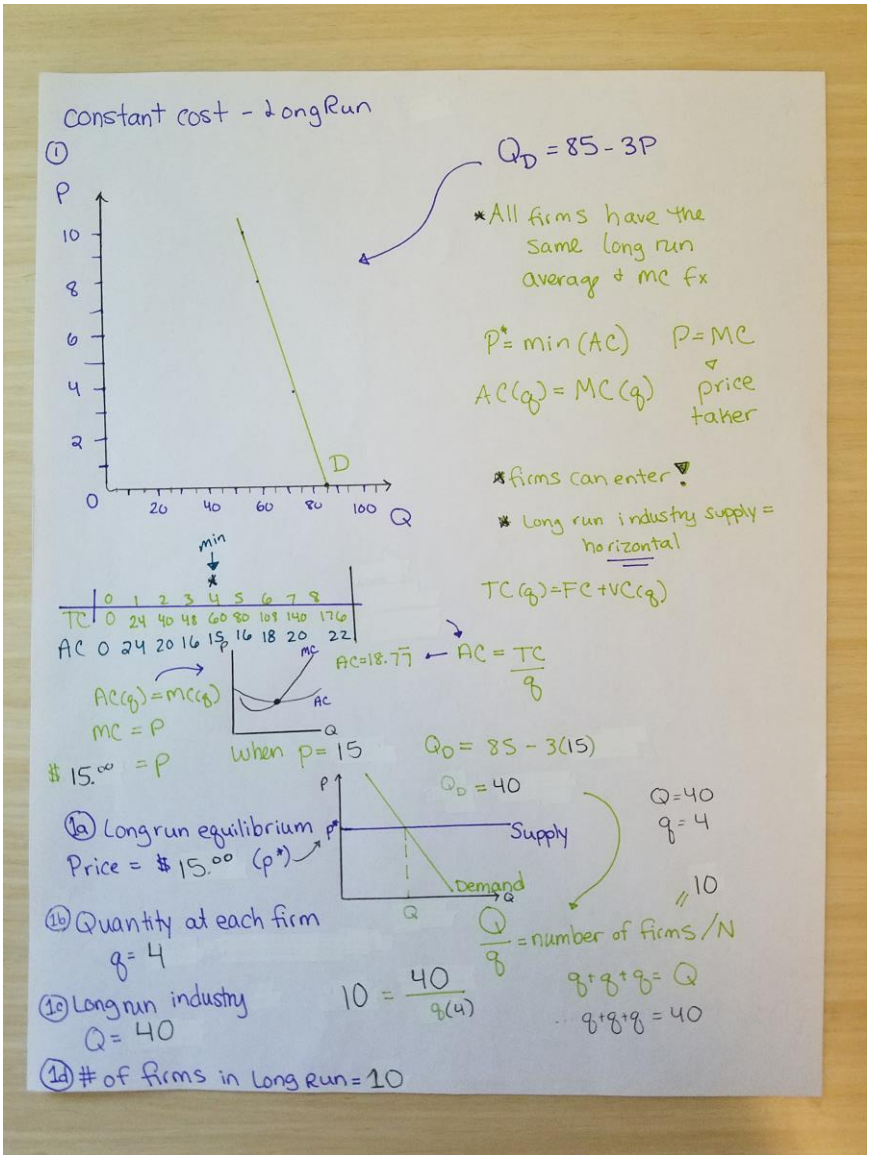
See work in appendix

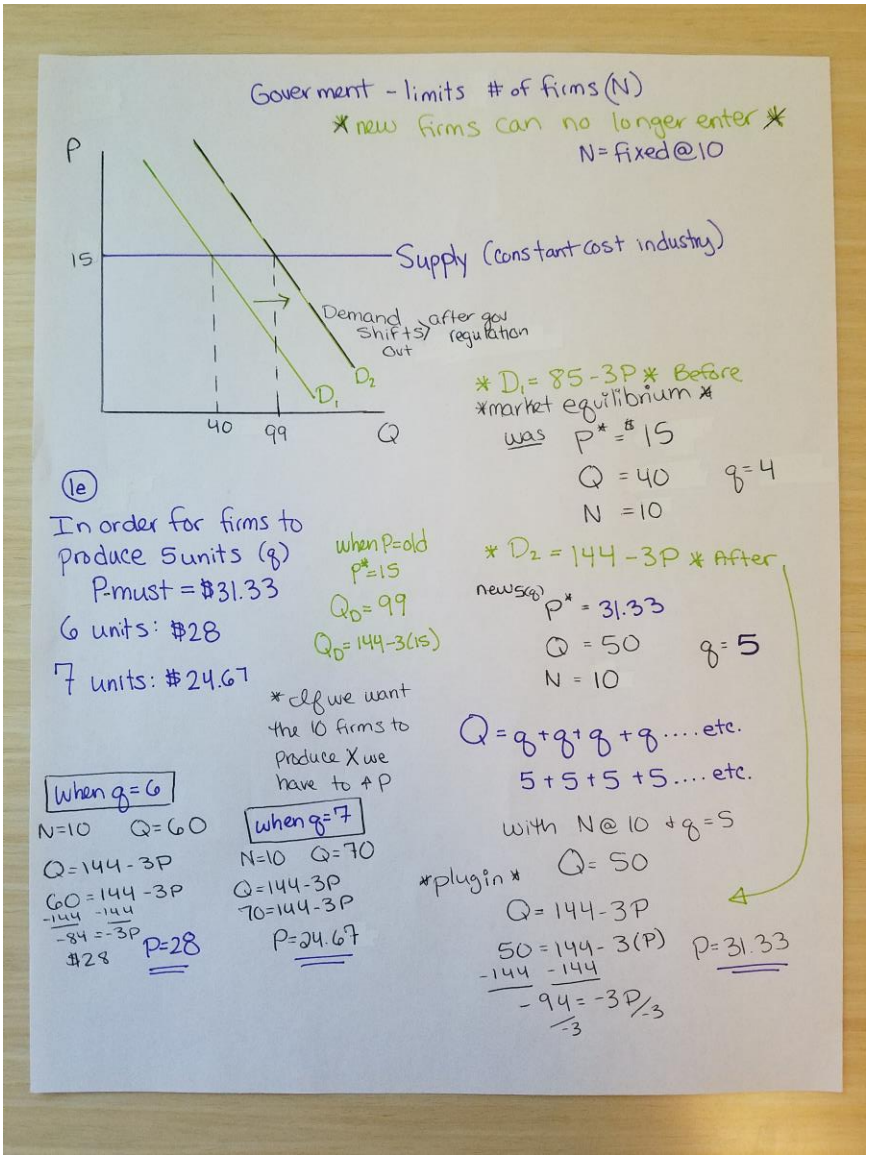
d. Now suppose that Hayley cannot charge different prices to seniors and young people. However, Hayley can charge different prices for dinner at 6 and for dinner at 7. How much should Hayley charge for dinner at 6? For dinner at 7? How much profit will Hayley earn?

Hayley should charge $29 at 6pm and $35 at 7pm to turn an optimal profit $8,800

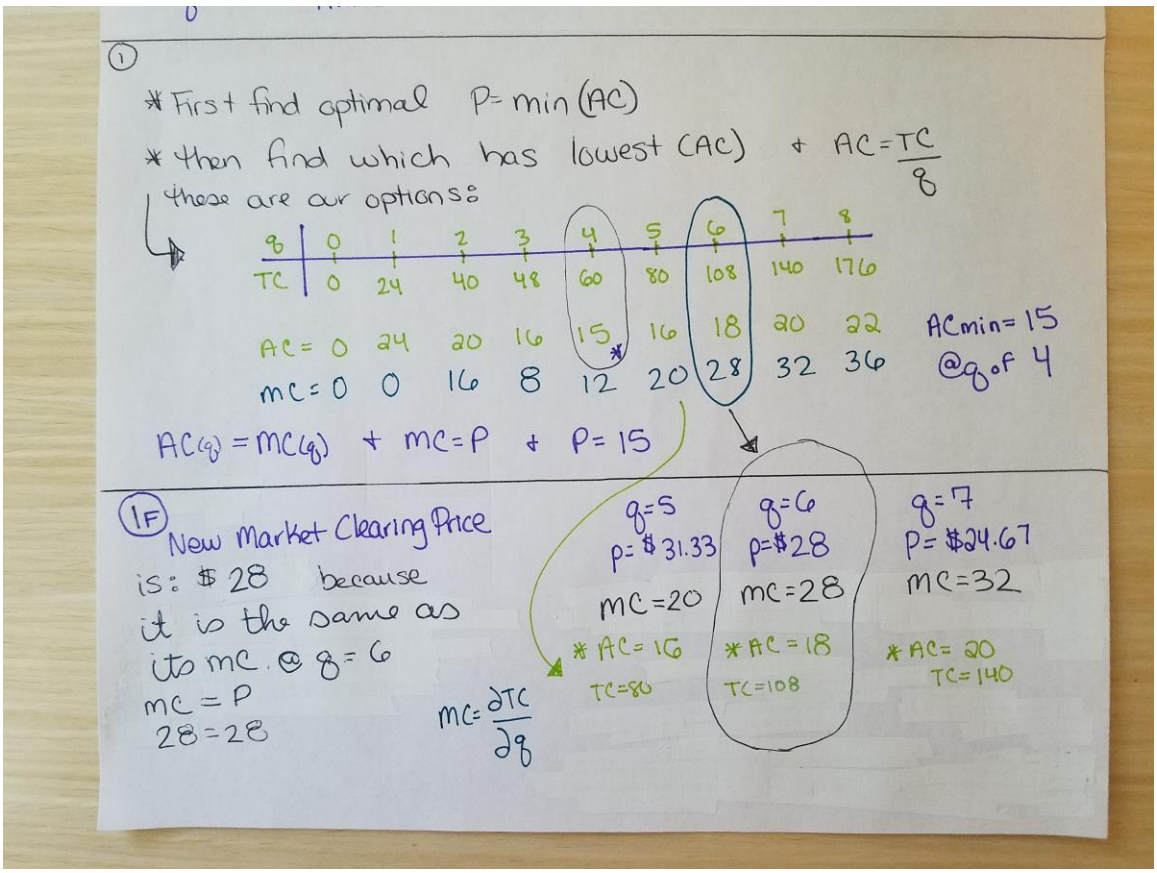
See work in appendix

Appendix:

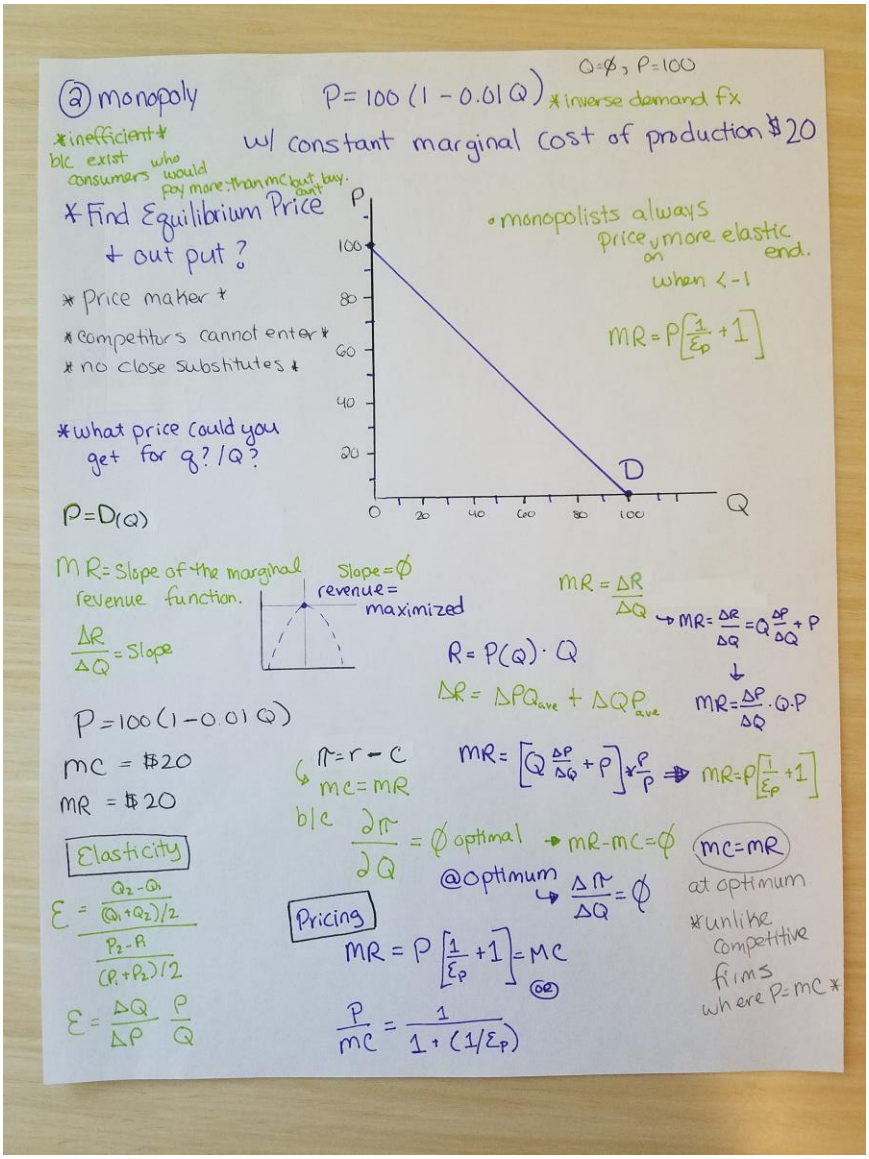

Constant cost - Long Run
(1)
P
10
8
6
4
2
0
20
40
60
80
100
Q
D
$Q_D = 85 - 3P$
*All firms have the same long run average & MC fx
$P^* = \min(AC)$
$P = MC$
$AC(q) = MC(q)$
price taker
*firms can enter!
* Long run industry supply = horizontal
$TC(q) = FC + VC(q)$
min
0 1 2 3 4 5 6 7 8
TC 0 24 40 48 60 80 108 140 176
AC 0 24 20 16 15 16 18 20 22
$AC = \frac{TC}{q}$
AC=18.77
MC
AC
Q
$AC(q) = MC(q)$
$MC = P$
$15.00 = P$
when $P = 15$
$Q_D = 85 - 3(15)$
$Q_D = 40$
P
Supply
Demand
Q
(1a) Long run equilibrium
Price = $15.00 ($P^*$)
(1b) Quantity at each firm
$q = 4$
(1c) Long run industry
$Q = 40$
(1d) # of firms in Long Run = 10
$10 = \frac{40}{q(4)}$
Q=40
q=4
=10
$\frac{Q}{q}$ = number of firms / N
$q+q+q = Q$
$q+q+q = 40$

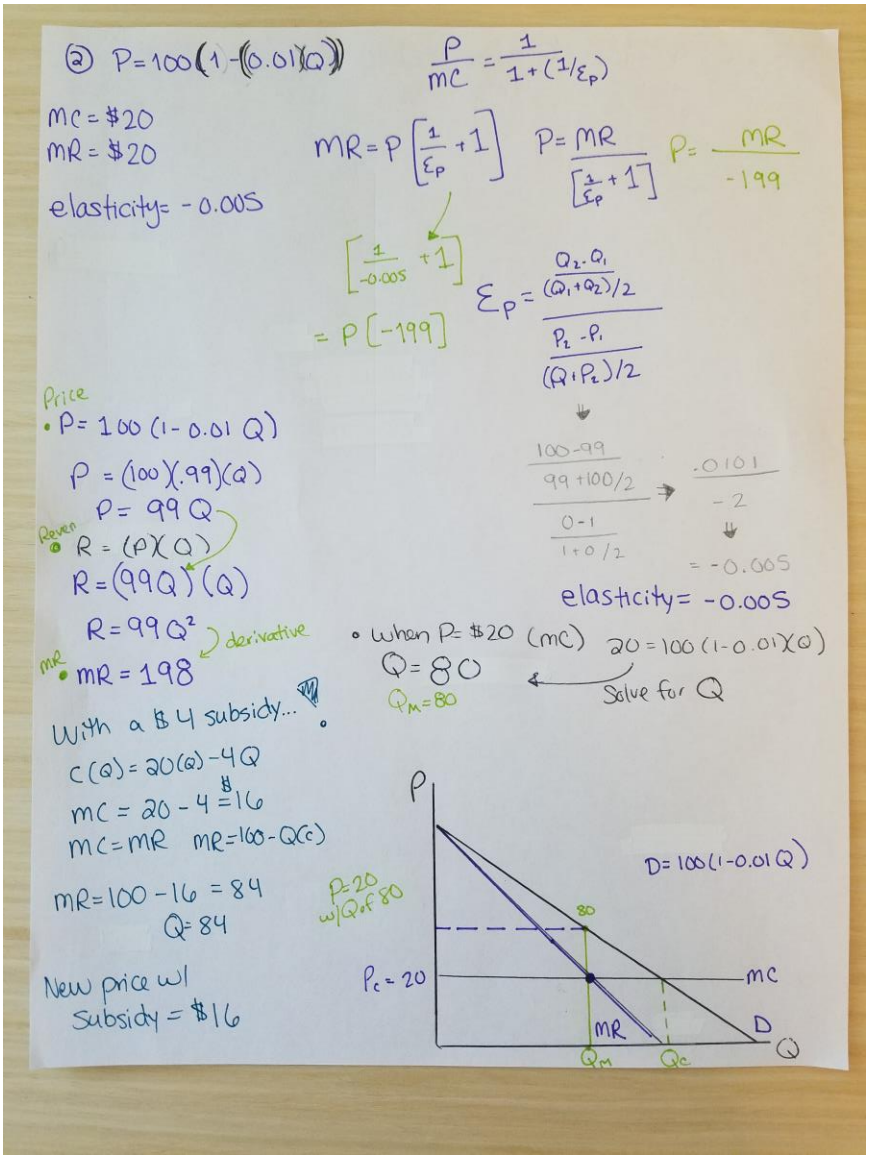

Government - limits # of firms (N)
* new firms can no longer enter *
N = fixed @ 10
P
15
Supply (constant cost industry)
Demand shifts in after gov regulation
D2
D1
40
99
Q
* D1 = 85 - 3P * Before
market equilibrium
was P* = $15
Q = 40
q = 4
N = 10
1e
In order for firms to produce 5 units (q)
P-must = $31.33
6 units: $28
7 units: $24.67
when P=old P*=15
QD = 99
QD = 144 - 3(15)
* D2 = 144 - 3P * After
new S(q)
P* = 31.33
Q = 50
q = 5
N = 10
* if we want the 10 firms to produce X we have to ↑ P
Q = q + q + q + q .... etc.
5 + 5 + 5 + 5 .... etc.
with N @ 10 & q = 5
plugin Q = 50
when q = 6
N = 10 Q = 60
Q = 144 - 3P
60 = 144 - 3P
-144 -144
-84 = -3P
$28
P = 28
when q = 7
N = 10 Q = 70
Q = 144 - 3P
70 = 144 - 3P
P = 24.67
Q = 144 - 3P
50 = 144 - 3(P)
-144 -144
-94 = -3P / -3
-3
P = 31.33

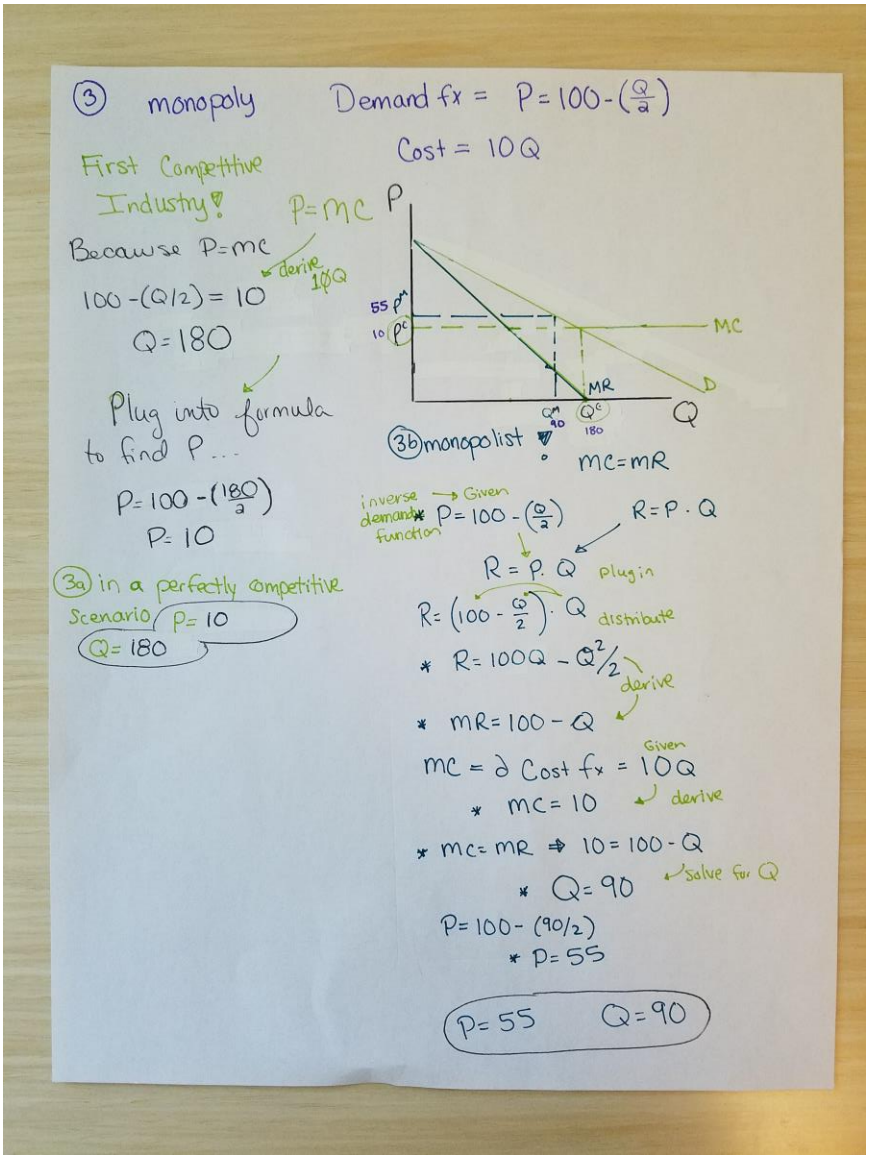
0

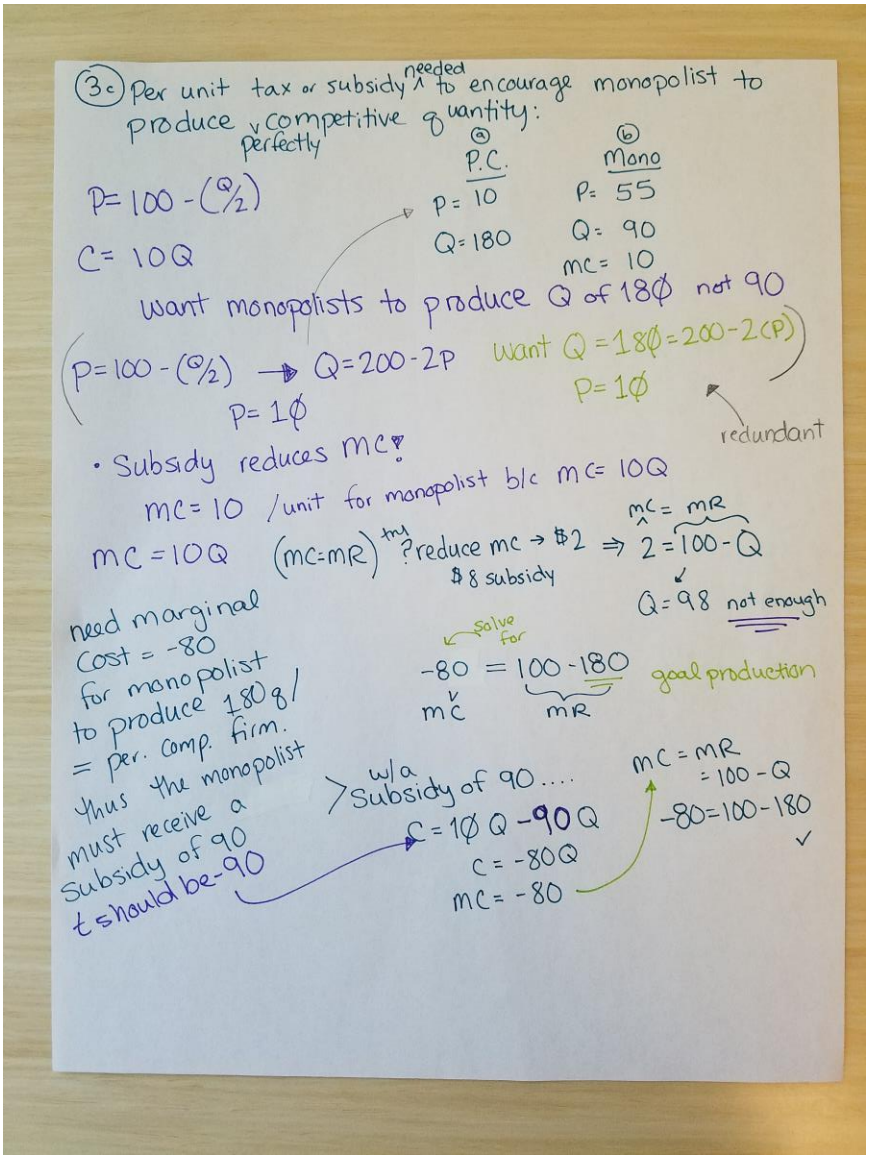

① * First find optimal P= min (AC)
* then find which has lowest (AC) & AC = TC/q
these are our options:
q | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8
TC | 0 | 24 | 40 | 48 | 60 | 80 | 108 | 140 | 176
AC = 0 | 24 | 20 | 16 | 15 * | 16 | 18 | 20 | 22
MC = 0 | 0 | 16 | 8 | 12 | 20 | 28 | 32 | 36
ACmin = 15 @ q of 4
AC(q) = MC(q) & MC = P & P = 15
1F New Market Clearing Price is: $28 because it is the same as its MC @ q = 6
MC = P
28 = 28
MC = ∂TC/∂q
q=5 p=$31.33 MC=20 * AC=16 TC=80
q=6 p=$28 MC=28 * AC=18 TC=108
q=7 p=$24.67 MC=32 * AC=20 TC=140

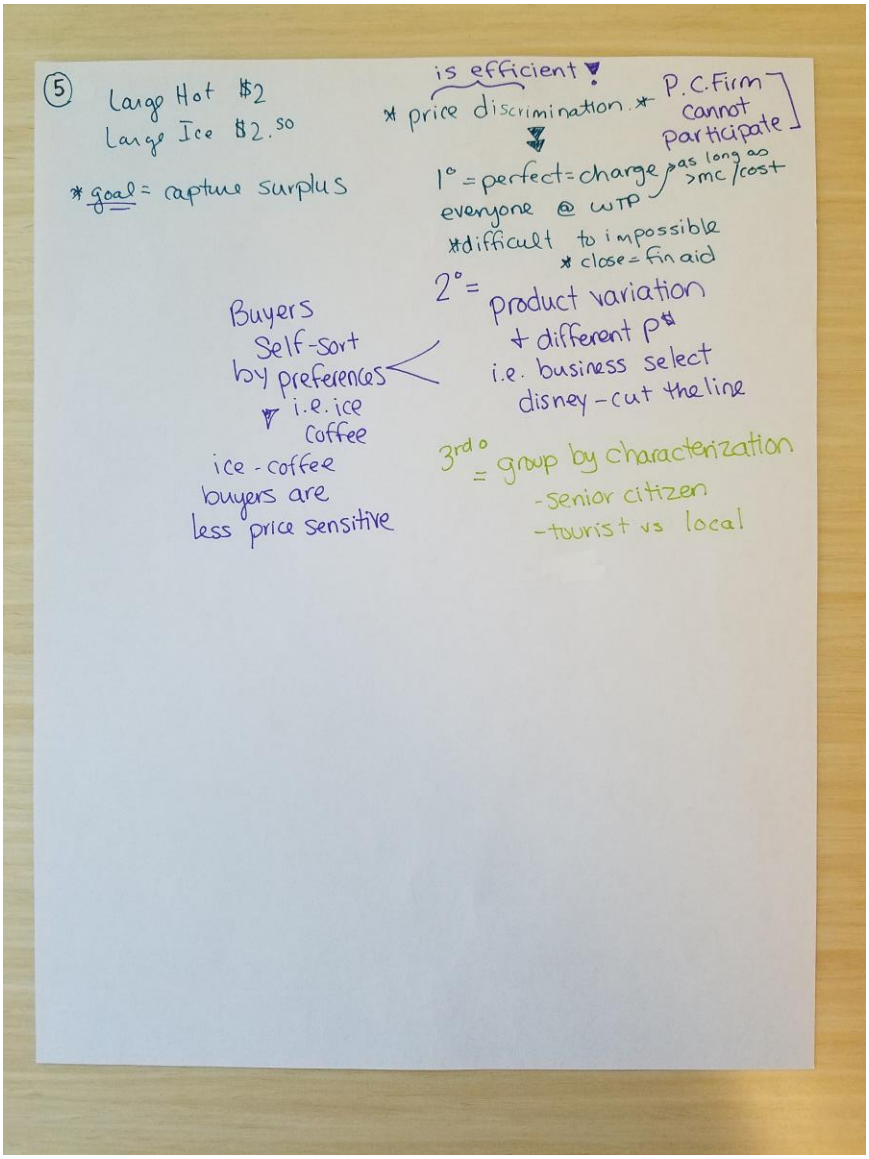
1

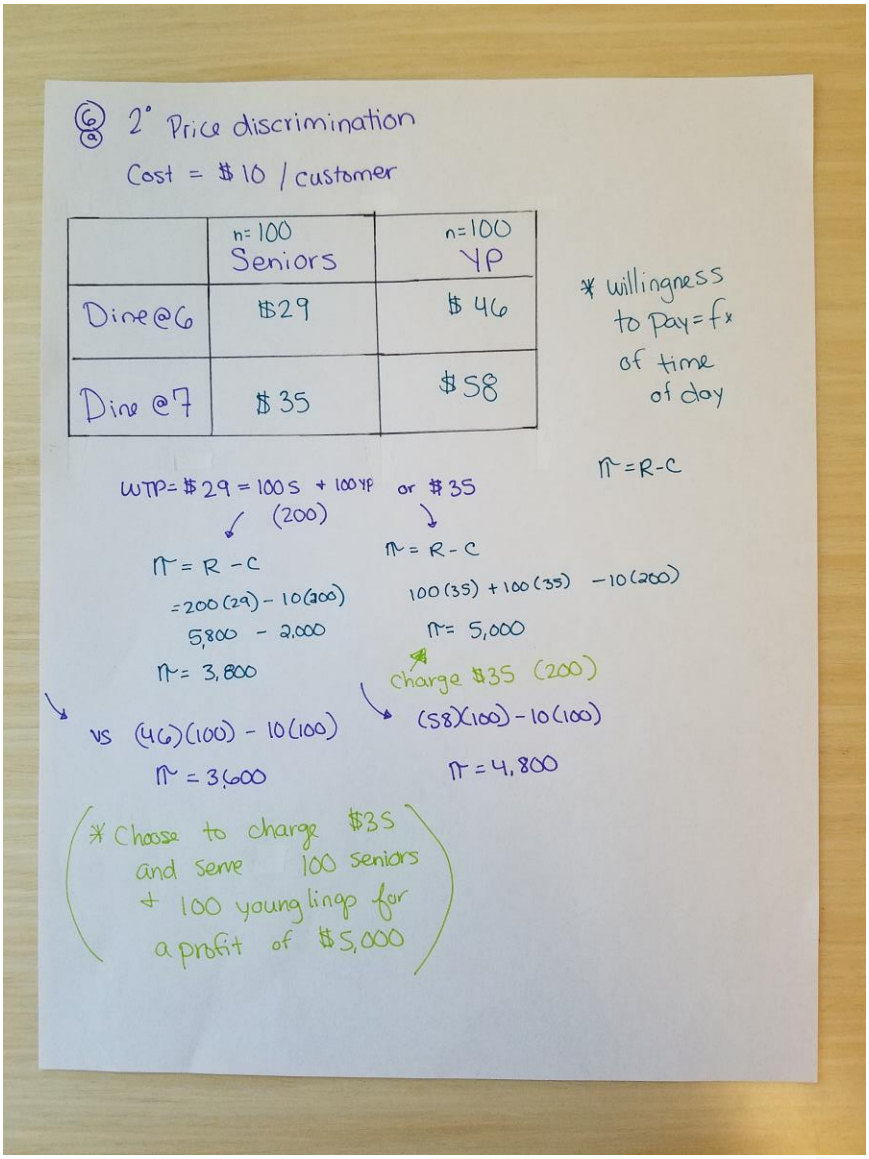

② monopoly
P = 100 (1 − 0.01 Q)
Q=ϕ, P=100
* inverse demand fx
w/ constant marginal cost of production $20
inefficient b/c exist consumers who would pay more than mc but can't buy.
* Find Equilibrium Price + out put ?
* price maker *
* competitors cannot enter *
* no close substitutes *
*what price could you get for q? / Q?
P=D(Q)
P
100
80
60
40
20
D
0 20 40 60 80 100 Q
• monopolists always price on more elastic end. when < -1
MR = P[1/ε_P + 1]
MR = Slope of the marginal revenue function.
ΔR/ΔQ = Slope
Slope = ϕ revenue = maximized
MR = ΔR/ΔQ → MR = ΔR/ΔQ = Q ΔP/ΔQ + P
R = P(Q) · Q
ΔR = ΔP Q_ave + ΔQ P_ave
MR = ΔP/ΔQ · Q · P
P = 100 (1 − 0.01 Q)
mc = $20
MR = $20
π = r − c
mc = MR
MR = [Q ΔP/ΔQ + P] P/P → MR = P[1/ε_P + 1]
b/c ∂π/∂Q = ϕ optimal → MR − MC = ϕ
@optimum → Δπ/ΔQ = ϕ
mc = MR at optimum
*unlike competitive firms where P = mc *
Elasticity
ε = ((Q2 − Q1)/((Q1 + Q2)/2)) / ((P2 − P1)/((P1 + P2)/2))
ε = ΔQ/ΔP · P/Q
Pricing
MR = P[1/ε_P + 1] = MC
P/mc = 1/(1 + (1/ε_P))

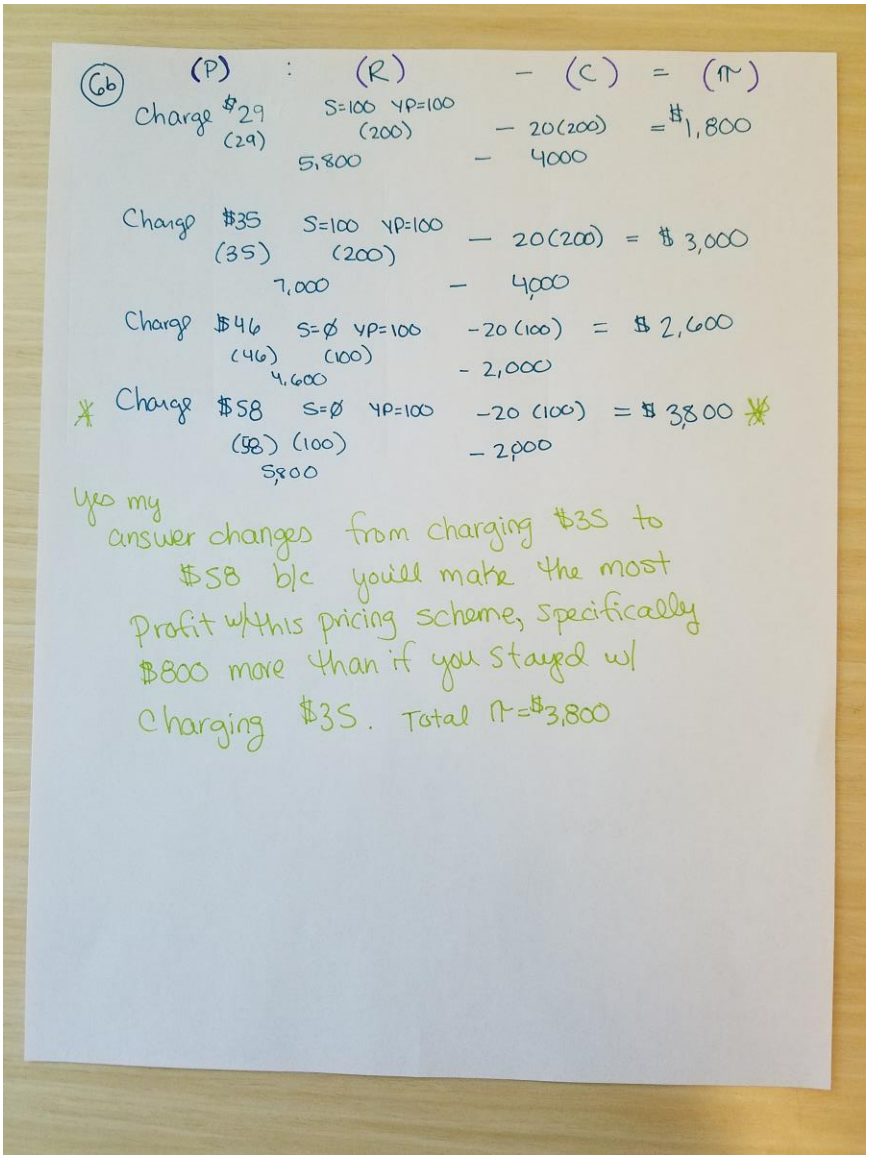

② P=100(1-(0.01)(Q))
P/MC = 1/(1+(1/ε_P))
MC = $20
MR = $20
elasticity = -0.005
MR = P[1/ε_P + 1]
P = MR / [1/ε_P + 1]
P = MR / -199
[1/-0.005 + 1]
= P[-199]
ε_P = ((Q2-Q1)/((Q1+Q2)/2)) / ((P2-P1)/((P1+P2)/2))
100-99 / 99+100/2 → .0101 / -2 = -0.005
elasticity = -0.005
Price
• P = 100(1-0.01Q)
P = (100)(.99)(Q)
P = 99Q
Reven
• R = (P)(Q)
R = (99Q)(Q)
R = 99Q²
derivative
MR
• MR = 198
• when P = $20 (MC) 20 = 100(1-0.01)(Q)
Q = 80
Q_M = 80
Solve for Q
With a $4 subsidy...
C(Q) = 20(Q) - 4Q
MC = 20 - 4 = $16
MC = MR MR = 100 - Q(c)
MR = 100 - 16 = 84
Q = 84
P=20 w/Q of 80
New price w/ Subsidy = $16
P
D = 100(1-0.01Q)
80
P_c = 20
MC
MR
D
Q
Q_M
Q_c

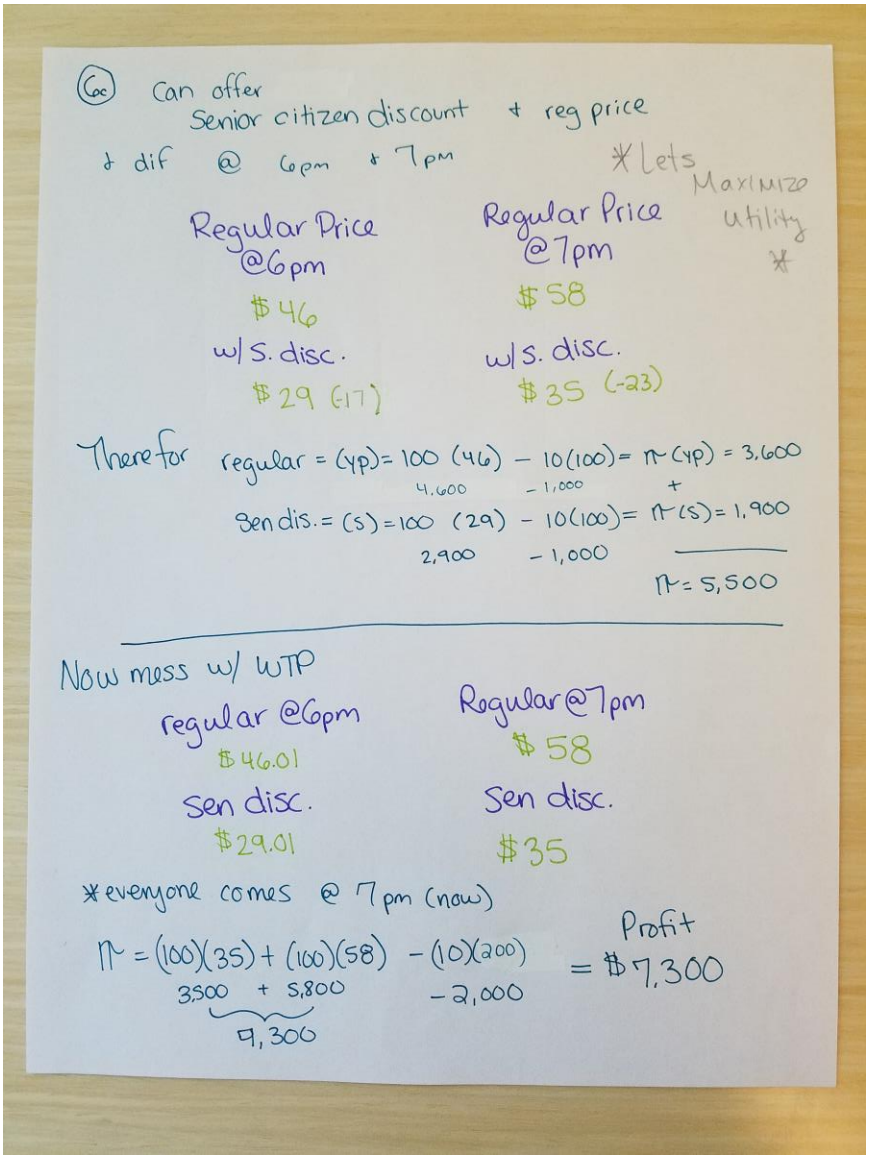

③ monopoly
Demand fx = P = 100 - (Q/2)
Cost = 10Q
First Competitive Industry!
P = MC
Because P = MC
derive 1ΦQ
100 - (Q/2) = 10
Q = 180
Plug into formula to find P...
P = 100 - (180/2)
P = 10
③a in a perfectly competitive scenario P = 10 Q = 180
P
55 Pm
10 Pc
MC
D
MR
Qm 90
Qc 180
Q
③b monopolist
MC = MR
inverse demand function
Given
P = 100 - (Q/2)
R = P · Q
R = P · Q plug in
R = (100 - Q/2) · Q distribute
R = 100Q - Q²/2
derive
MR = 100 - Q
MC = ∂ Cost fx = 10Q
Given
MC = 10
derive
MC = MR ⇒ 10 = 100 - Q
Solve for Q
Q = 90
P = 100 - (90/2)
P = 55
P = 55 Q = 90

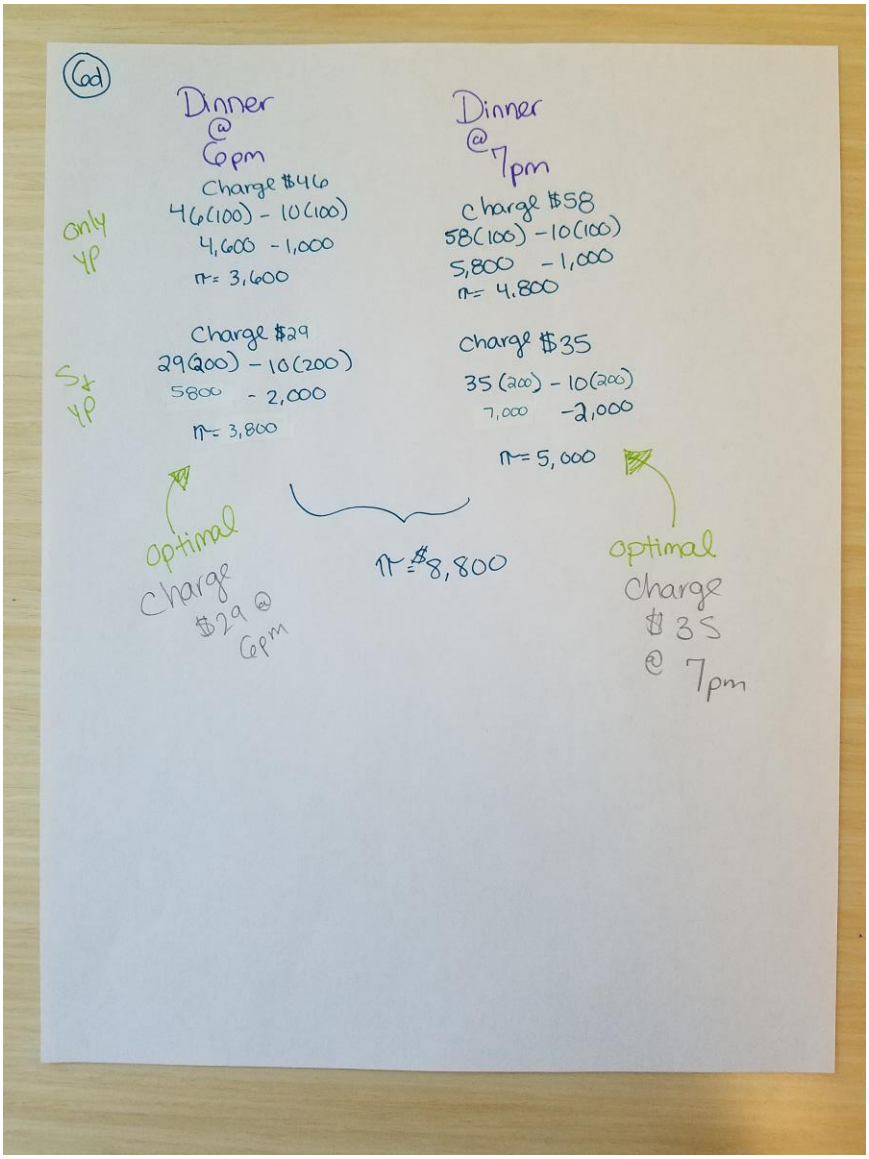

3c Per unit tax or subsidy needed to encourage monopolist to produce competitive perfectly quantity:
P = 100 - (Q/2)
C = 10Q
(a) P.C.
P = 10
Q = 180
(b) Mono
P = 55
Q = 90
MC = 10
want monopolists to produce Q of 18∅ not 90
P = 100 - (Q/2) → Q = 200 - 2P
P = 1∅
want Q = 18∅ = 200 - 2(P)
P = 1∅
redundant
• Subsidy reduces MC!
MC = 10 /unit for monopolist b/c MC = 10Q
MC = 10Q (MC=MR) try? reduce MC → $2 ⇒ $8 subsidy
MC = MR
2 = 100 - Q
Q = 98 not enough
need marginal cost = -80 for monopolist to produce 180 q/ = per. comp. firm. thus the monopolist must receive a subsidy of 90 t should be -90
solve for
-80 = 100 - 180
MC MR
goal production
w/a Subsidy of 90....
C = 1∅Q - 90Q
C = -80Q
MC = -80
MC = MR
= 100 - Q
-80 = 100 - 180 ✓


5
Large Hot $2
Large Ice $2.50
* goal = capture surplus
is efficient!
* price discrimination. *
P.C. Firm cannot participate
1° = perfect = charge everyone @ WTP
as long as > mc / cost
*difficult to impossible
* close = fin aid
2° = product variation + different p*
i.e. business select
disney - cut the line
Buyers Self-sort by preferences
i.e. ice Coffee
ice - coffee buyers are less price sensitive
3rd° = group by characterization
- senior citizen
- tourist vs local


2° Price discrimination
Cost = $10 / customer
n=100 Seniors
n=100 YP
Dine@6
$29
$46
Dine @7
$35
$58
* willingness to pay = f(x) of time of day
Π = R - C
WTP = $29 = 100S + 100YP
(200)
or $35
Π = R - C
= 200(29) - 10(200)
5,800 - 2,000
Π = 3,800
Π = R - C
100(35) + 100(35) - 10(200)
Π = 5,000
Charge $35 (200)
(58X100) - 10(100)
Π = 4,800
vs (46)(100) - 10(100)
Π = 3,600
* Choose to charge $35 and serve 100 seniors + 100 younglings for a profit of $5,000


(6b)
(P) : (R) − (C) = (π)
Charge $29 (29) S=100 YP=100 (200) 5,800 − 20(200) − 4000 = $1,800
Charge $35 (35) S=100 YP=100 (200) 7,000 − 20(200) − 4,000 = $3,000
Charge $46 (46) S=0 YP=100 (100) 4,600 −20(100) - 2,000 = $2,600
Charge $58 (58) S=0 YP=100 (100) 5,800 −20(100) − 2,000 = $3800
Yes my answer changes from charging $35 to $58 b/c you'll make the most Profit w/this pricing scheme, specifically $800 more than if you stayed w/ Charging $35. Total π=$3,800


(6c) Can offer
Senior citizen discount + reg price
+ dif @ 6pm + 7pm
* Lets Maximize utility *
Regular Price @6pm
$46
w/ S. disc.
$29 (-17)
Regular Price @7pm
$58
w/ S. disc.
$35 (-23)
Therefor regular = (Yp) = 100 (46) − 10(100) = π (Yp) = 3,600
4,600 − 1,000
Sen dis. = (S) = 100 (29) − 10(100) = π (S) = 1,900
2,900 − 1,000
π = 5,500
Now mess w/ WTP
regular @6pm
$46.01
Sen disc.
$29.01
Regular @7pm
$58
Sen disc.
$35
* everyone comes @ 7pm (now)
π = (100)(35) + (100)(58) − (10)(200)
3,500 + 5,800 − 2,000
9,300
Profit
= $7,300


God
Dinner @ 6pm
Charge $46
46(100) - 10(100)
4,600 - 1,000
π = 3,600
Dinner @ 7pm
Charge $58
58(100) - 10(100)
5,800 - 1,000
π = 4,800
only YP
Charge $29
29(200) - 10(200)
5800 - 2,000
π = 3,800
Charge $35
35(200) - 10(200)
7,000 - 2,000
π = 5,000
S↓ YP
optimal
Charge $29 @ 6pm
π = $8,800
optimal
Charge $35 @ 7pm

0