Name: _____ **KEY** _____

100 points total. Point values for each question are as indicated. Answer each question in the space provided. General advice: show your work, including any formulas or diagrams that you use in reasoning through your answers.

1. (12 pts.) In the current public discourse about social economic organization, several terms/concepts keep coming up in the discussion. Capitalism, central planning/command, markets, socialism—what do they all mean? As a student of economics, you should have a clear understanding of what each of these terms mean. Explain/define each and discuss how they fit into any analysis or classification scheme of how different countries organize economic activity.

Economic systems can be classified according to (1) the decision-making process and (2) the ownership of resources. Markets vs. central planning refers to the decision-making process. Capitalism vs. socialism refers to the ownership of resources.

Every economic system must answer three basic economic questions: What goods will be produced and in what amounts? How will these goods be produced, i.e. what production techniques will be used? And For Whom will these goods be produced, i.e. who gets to consume the goods that the economy produces? Decision-making is decentralized in market systems. Consumers are sovereign, and decide what goods will be produced by voting with their dollars. Firms will choose inputs and production techniques so as to minimize costs, motivated by the quest for profits. Those households who both want and can afford to pay for goods will consume them. Decision-making is centralized in a command or centrally planned economy. The central planners will make all three decisions, deciding what will be produced, how the chosen outputs will be produced, and rationing goods among consumers by central diktat.

The scarce resources of a society can be privately owned by households or commonly or publicly owned by everyone (and hence no one). In a capitalistic system, human resources, buildings, machinery and equipment, and natural resources including land are owned by private individuals. And ownership implies the right to sell those ownership rights to another party. In a socialistic system, property rights do not reside with individuals. Land, factories, and other scarce resources are owned by everyone, which means that no one person or persons own land or factories. In the extreme case, individuals do not own their own labor, but instead work for the common good.

2. (18 pts.) Cobalt is a hard and lustrous metal and is mainly obtained as a byproduct of copper mining. It is a key component in the manufacture of batteries for electric cars. Both the price and quantity exchanged of cobalt has increased in the past several years. Two of your friends who don't understand economics as well as you do have competing explanations. One thinks that it must be because increased construction activity in China has led to a worldwide increase in the demand for copper. The other thinks that it is because several countries have mandated or are considering mandating electric cars, leading to an increase in the demand for electric cars around the world. In the diagrams below, evaluate each of these two competing hypotheses, illustrating and explaining what would happen in each market. Which of your friends' explanation is consistent with the observed changes in the cobalt market?

Friend #1:

Copper market

COBALT Market
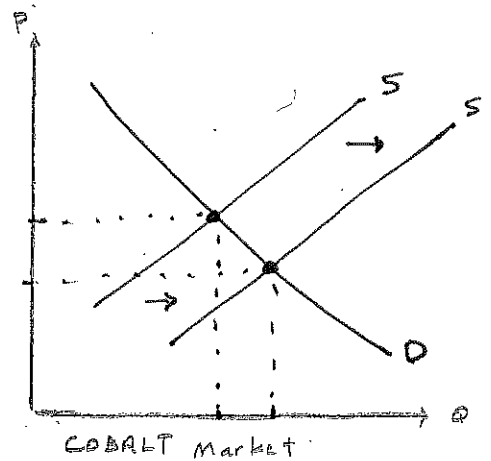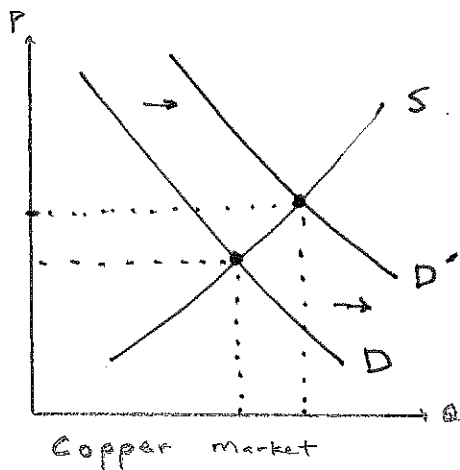
Increase in price of copper leads to shift right in supply curve for cobalt. Lower price but higher output for cobalt.

Friend #2:

Electric Car Market

COBALT Market
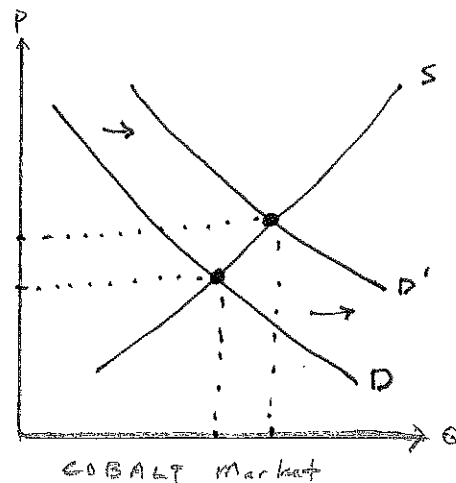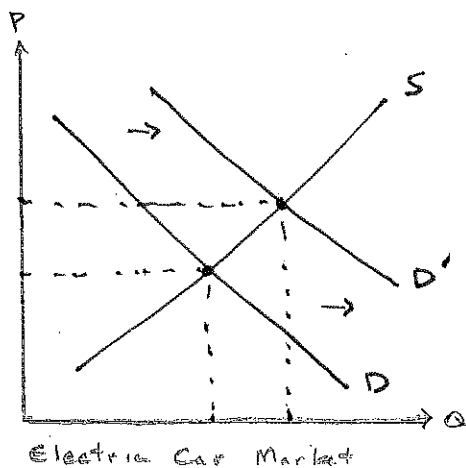
Increase in demand for electric cars leads to increase in demand for a key input in car batteries — cobalt. Increase in D_cobalt leads to higher price and output.

Friend #1's explanation is inconsistent with the observed facts — higher price and higher output in cobalt market.
Friend #2 has a consistent explanation.

3. (20 pts.) The Lexington Legends, a minor-league baseball team, approach you for advice. They are wondering about their pricing strategy. Currently they charge $10 per ticket for admission, and allow patrons to sit anywhere they want. They have observed that some fans come several hours before game time, and grab the best seats behind home plate and close to the field. Other fans arrive later and have to sit in the less desirable bleacher seats in the outfield. All of the 500 seats behind home plate fill up every night, but usually most of the 2000 outfield seats go unsold. On an average night, total attendance is 800.

   a. You propose an experiment to determine own-price elasticity of demand for the good seats behind home plate. When you raise the price of those prime tickets to $20 but keep general admission tickets constant at $10, only 400 patrons buy the good seats and the other 100 still buy tickets but sit in the bleachers with the 300 people who sat there under the old pricing scheme. Calculate own-price elasticity of demand for prime seating behind home plate. (Assume that quantity demanded for these seats was 800 when P=$10.)

$$E_{x,P_x} = -\frac{\% \,\Delta X_D}{\% \,\Delta P_x} = -\frac{\frac{X_1 - X_0}{\frac{1}{2}(X_1 + X_0)}}{\frac{P_1 - P_0}{\frac{1}{2}(P_1 + P_0)}} = -\frac{\frac{400 - 800}{\frac{1}{2}(400 + 800)}}{\frac{20 - 10}{\frac{1}{2}(20 + 10)}} = \frac{\frac{400}{600}}{\frac{10}{15}} = 1$$

   unitary elasticity of demand for the prime seating.

   b. After several weeks under the new pricing policy, you decide to try another experiment. You suggest lowering the price of bleacher seats from $10 to $5. When you do that, you find that ticket sales for the cheap seats increase from 400 to 1200. Calculate own-price elasticity of demand for bleacher seats.

$$E_{x,P_x} = -\frac{\frac{1200 - 400}{\frac{1}{2}(1200 + 400)}}{\frac{5 - 10}{\frac{1}{2}(5 + 10)}} = \frac{\frac{800}{800}}{\frac{5}{7.5}} = 1.5$$

   demand is elastic for bleacher seats

   c. Briefly discuss the implications of these price changes and your calculated own-price elasticities for the club's total revenues.

Unitary elasticity usually means that a given relative change in price results in an equal and opposite relative change in quantity demanded, so total revenue doesn't change. In this case, however, since the capacity of prime seats is capped at 500, and since those customers who don't get prime seats when the price is $10 happily spill over into the bleacher seats in the outfield, your revenue from prime seats increases. 500 tickets at $10 per ticket yields $5000, while 400 tickets at $20 yields $8000. If you are selling 400 tickets at $10 each in the bleachers, total revenue is $4000. Lowering price to $5 increases ticket sales to 1200, increasing revenue from the bleacher seats to $6000. Lowering price when demand is elastic increases total revenue.

4. (10 pts.) Your cousin can't decide what to do with her life. Having just gotten a smart phone and downloading the Uber and Lyft apps, she explores becoming a contract driver for one of these taxi services. She comes up with the following information:
   - If she works full time, she can generate $100,000 in revenues each year.
   - She would have to buy a suitable car, which would cost her $25,000.
   - Annual operating expenses for such a car, such as gas, oil, and maintenance, would come to $15,000.
   - Other operating expenses like taxes, insurance, and licenses, would cost $5,000.
   - To buy the car, she would have to take the money out of her savings, where it was earning 6%.
   - Wear and tear on the car would cause its market value to decline by $5000 per year each year she drives for Lyft or Uber.
   - Having just graduated from college last May, she has already turned down several jobs paying $50,000 per year.

   Help her evaluate the economic profitability of becoming a taxi driver. What should she do?

①

Annual income if driving taxi:

Total Revenue: $100,000

Total Costs: $15,000   gas, oil, maintenance   ⎫ Explicit
                 5,000   taxes, insurance, license ⎭

                 1,500   interest earnings foregone ⎫
                           on $25,000 @ 6%   ⎪
                 5,000   depreciation on car   ⎬ Implicit
                $50,000   foregone salary on best   ⎪
                           alternative job   ⎭
                ————————
                $76,500

Economic Profit = Total Revenue − Total Explicit Costs
                − Total Implicit Costs

Economic Profit = $100,000 − $76,500 = $23,500

If she drives a taxi she is $23,500 better off than if she takes another job at $50,000 and keeps her $25,000 in the bank @ 6%.

4. (10 pts.) Your cousin can't decide what to do with her life. Having just gotten a smart phone and downloading the Uber and Lyft apps, she explores becoming a contract driver for one of these taxi services. She comes up with the following information:
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   Help her evaluate the economic profitability of becoming a taxi driver. What should she do?

②

Dec 31, 2018 : $25,000 in bank, no job

1/1/19 ←   ↘ 1/1/19

Take other job, keep money in bank

Drive taxi, take $25K out of bank to buy car

$50,000   salary
$1,500   interest earnings
_____

+ $100,000   in revenue
-   15,000   gas, oil, maintenance
-   5,000   tax, ins., license
_____
    $80,000   net revenue

Dec 31, 2019:

$51,500 income for the year and still have $25K in the bank

on Dec 31, 2019, sell car for $20,000 and take $5000 out of net revenue. Put $25,000 back in bank and you have $75,000 to show for your year.

↖   ↗

$23,500 better off if drive taxi

5. (15 pts.) Your parents are considering opening a pancake restaurant in a beach resort community along the southern Atlantic coast. They ask you to research the production function relationship between the two key inputs, labor and capital, and the number of meals produced per day. The table below contains the results of your research:

		Labor Input				
		1	2	3	4	5
	1	40	80	110	130	150
Capital	2	80	120	150	170	180
Input	3	110	150	180	200	210
	4	130	170	200	220	230
	5	150	180	210	230	240

K = L for minimum cost. All are points on firm's LRAC

Per unit-prices for labor and capital are w = $40 and v = $40. For this particular production function, when both input prices are the same, the long-run least-cost combination of inputs occurs where K = L. Using this information, graph five points on this firm's long-run average cost curve in the diagram below. If the market is big enough to support several restaurants like the one they are considering, what size restaurant would you recommend that they build? (In other words, what level of K, where K can be thought of as the flow of capital services per hour embodied in different-sized restaurants?) Explain your answer, using concepts of economies and diseconomies of scale and MES.
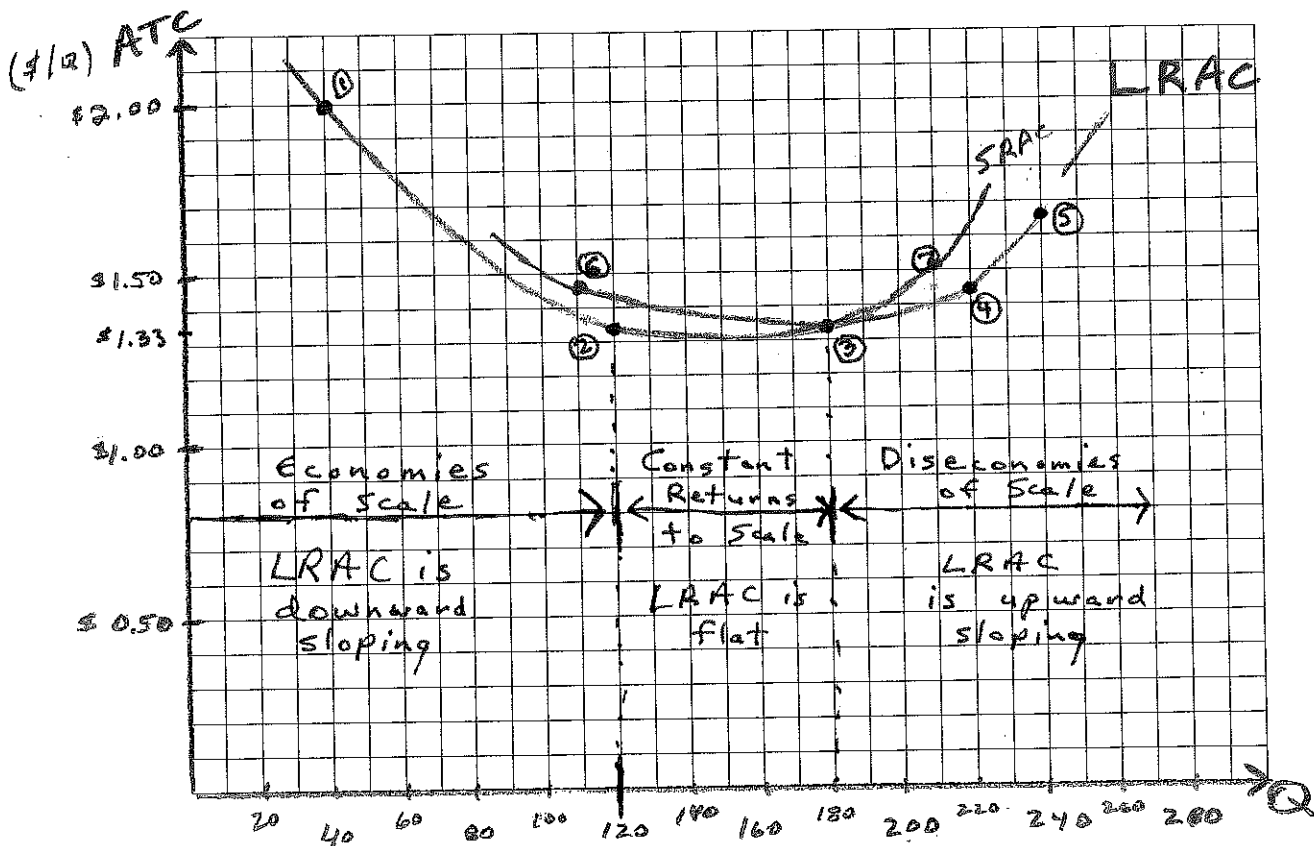
MES
[Minimum Efficient Scale]

	L	K	Q	TC	ATC
①	1	1	40	80	$2.00
②	2	2	120	160	$1.33
③	3	3	180	240	$1.33
④	4	4	220	320	$1.45
⑤	5	5	240	400	$1.67

6. (10 pts.) Your parents decide to choose K=3, and build and equip a restaurant of that size. In the short run, they are stuck with K=3 in making short-run production decisions. Most of the year they produce and serve 170-190 meals per day, and seem pretty happy. During the coldest winter months, however, when they are only serving slightly more than 100 meals per day, they gripe about their costs. On peak-demand holiday weekends when they are serving over 200 meals per day, they also gripe. In the diagram on the previous page, plot three points on their SRATC curve corresponding to outputs of 110, 180, and 210 and explain their griping, even though they don't regret their decision to build the size restaurant they did.

for $\bar{K}=3$:

L	Q	TC	ATC	
1	110	160	$1.45	← pt. # ⑥ on graph
2	150	200	$1.33	
3	180	240	$1.33	← pt. # ③ on graph
4	200	280	$1.40	
5	210	320	$1.52	← pt. # ⑦ on graph

when K is fixed at $\bar{K}=3$ and $L=1$, ATC is high because you are underutilizing restaurant capacity — your fixed costs per meal are high. when $\bar{K}=3$ and $L=5$, ATC is high because you are overutilizing capacity — diminishing returns have set in.

7. (5pts.) In Somerset, KY and in Elkhart, IN, the local economies suffer when the economy stagnates and household incomes fall. The major manufacturing sector in Somerset is houseboats, and in Elkhart is recreational vehicles. Some local retailers like Dollar Store and Dollar General, do quite well during these economic downturns. Using elasticity concepts, explain why this might be the case.

$$E_{x,Income} = \frac{\% \Delta X_D}{\% \Delta Income}$$

$E_{x,I} > 0 \Rightarrow$ normal good

$E_{x,I} > 1 \Rightarrow$ luxury

$0 < E_{x,I} < 1 \Rightarrow$ necessity

$E_{x,I} < 0 \Rightarrow$ inferior good

Houseboats and RV's are luxury goods, i.e. $E_{x,I} > 1$.
A small decline in household incomes will lead to a big decline in the demand for houseboats and RV's.
The houseboat and RV sectors will suffer in an economic downturn. Many goods sold at DS and DG are necessities and many others are inferior goods. As incomes fall, households flock to these stores.

8. (5 pts.) What do you think will happen to the size of container ships serving east coast ports now that the Panama Canal has recently been widened? Can you think of a reason (or two) why the LRAC associated with container ships is shaped the way that it is?

There are significant economies of scale in container ships (see "Meet the World's Largest Cargo Ships, WSJ 1/8/13). Widening the Panama Canal will allow bigger ships to pass through the locks, and so we expect to see bigger ships built to serve the Asia to East Coast USA market. Two reasons why the LRAC curve for container ships might slope downward are (1) engineering relationships—the rule of two-thirds and (2) fixed setup costs—it only takes one captain and crew to man the ship, whether it is big or small.

9. (5 pts.) You have been promoted to be brand manager for Pepsico-Frito/Lay's Rold Gold Pretzels. You know that prices of other products affect sales of Rold Gold Pretzels. What types of numbers would you expect to observe when you calculate cross-price elasticities between Rold Gold Pretzel sales and the prices of Frito-Lay potato chips, Snyder's pretzels, Diet Pepsi, and Pepsico's instant Quaker Oatmeal?

Cross-price elasticity measures the substitute/complement relationship that exists between two goods. Positive cross-price elasticities indicate that the two goods are substitutes and negative cross-price elasticities indicate that the two goods are complements. A zero cross-price elasticity indicates that the two goods are unrelated in demand. The magnitude of the number indicates the strength of the substitute/complement relationship. Different brands of pretzels are likely to be close substitutes, so we would expect a large positive number for Rold Gold and Snyder's pretzels. Lay's potato chips are a different salty snack, so we would expect a smaller positive number for Lay's potato chips and Rold Gold pretzels. Salty snacks often trigger thirst, so Diet Pepsi and Rold Gold pretzels are likely to be complements, and we would expect a negative number. And since oatmeal is usually consumed at breakfast and is not likely connected in demand with pretzels, we would expect a zero cross-price elasticity.