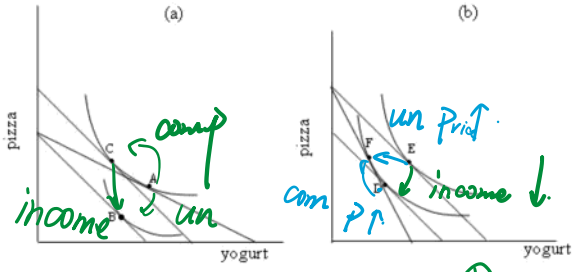
Homework: P-M, M-E and Monopoly

Select the best choice from the possible answers given:



1. Regarding figure (a), which statement is true?
   A) Yogurt is a normal good, and the movement from A to C shows the effect of a compensated price decrease.
   B) Yogurt is an inferior good, and the movement from B to C shows the effect of an uncompensated price decrease.
   C) Yogurt is a normal good, and the movement from A to B shows the effect of an uncompensated price increase.
   D) Yogurt is an inferior good, and the movement from A to B shows the effect of an uncompensated price increase.
   E) Yogurt is an inferior good, and the movement from A to C shows the effect of a compensated price decrease.

2. Regarding figure (b), which statement is true?
   A) Yogurt is a normal good, and the movement from E to F shows the effect of an uncompensated price increase.
   B) Yogurt is an inferior good, and the movement from D to F shows the effect of an uncompensated price decrease.
   C) Yogurt is a normal good, and the movement from D to E shows the effect of a compensated price decrease.
   D) Yogurt is an inferior good, and the movement form D to E shows the effect of a compensated price increase.
   E) Yogurt is a normal good, and the movement from F to D shows the effect of an uncompensated price increase.

3. The Law of Diminishing Marginal Returns can be described as the Law of Eventually Diminishing Returns because it states that
   A) marginal product of the variable input decreases at every possible value of the variable input.
   B) marginal product of the variable input eventually begins to decrease as the quantity of the variable input is increased.

C) marginal product of the fixed input eventually begins to decrease as the quantity of the variable input is increased.
D) none of the above

4. Sally has two art projects due tomorrow. She has 5 hours to complete both projects. She plans to spend 3 hours working on the first project and 2 hours working on the second project. She believes that the last minute spent working on the first project will add 3 points to Project # 1 score, and the last minute spent working on the second project will add 20 points to the Project # 2 score. Which of the following statements is accurate?
A) Assuming that Sally's goal is to maximize the total number of points, Sally's plan will allocate her time efficiently.
B) Sally would earn a higher point total if she increased the time allocated to Project # 1.
C) Sally would earn a higher point total if she decreased the time allocated to Project # 1.
D) None of the above

5. Suppose an industry is dominated by a large monopolist. If this industry exhibits increasing returns to scale,
A) splitting the large monopolist into several small competitive firms would increase efficiency.
B) splitting the large monopolist into several small competitive firms would decrease efficiency
C) splitting the large monopolist into several small competitive firms would not affect efficiency
D) None of the above.

6. Technological change
A) can make either labor or capital more productive
B) always increases the MP of capital
C) does not impact MRTS
D) none of the above

7. JetBlue has several different types of contracts for leasing gates at airports. At some airports, JetBlue must rent each gate for an entire day, regardless of the number of flights per day. At these airports, the gate rental expense is a:
A) variable cost.
B) fixed cost.
C) avoidable cost.
D) sunk cost.

8. Calpine's average cost function slopes up because:
A) Producing more electricity requires more natural gas. As Calpine increases output, it must use more natural gas, so the cost increases.
B) Calpine has diseconomies of scale.
C) Calpine uses its most efficient generators first. If that does not provide sufficient capacity, it adds generators that are less efficient. (Less efficient generators produce electricity at higher cost).
D) None of the above

9. Budget lines are one specific type of isocost line. The difference between the indifference

9. Budget lines are one specific type of isocost line. The difference between the indifference curve/ budget line graphs used to analyze consumer decisions and the isoquant/isocost graphs used to analyze firm input purchase decisions is:
   A) The household is more careful about how it spends its money.
   B) A household has one budget line because the household has a specific income at any point in time. In contrast, a firm looks at the entire family of isocost lines because the firm chooses the production quantity, buys inputs, and then sells the output to generate revenue. The firm is not restricted to one specific level of expenditure.
   C) None of the above

10. When the firm is using the least-cost combination of inputs,
   A) the ratio of the marginal products of the two inputs is equal to the ratio of the prices of the two inputs.
   B) the marginal product of the last dollar spent on input A is equal to the marginal product of the last dollar spent on input B.
   C) the ratio of the prices of the two inputs is equal to MRTS.
   D) all of the above

11. Dell noticed that computer manufacturers produced their products long before consumers bought them. This delay between producing the product and selling the product generates two types of costs in the computer industry. Identify the two that are noted in the class.
   I. The money spent to purchase the inputs and produce the product is not sitting in a bank. The opportunity cost of this capital is one of these costs.
   II.The cost of computer parts was falling rapidly at that time. If input purchases could be delayed, the unit price would be lower.
   III. Warehouses must be rented or purchased to store the assembled computers prior to sale
   A) I and III
   B) II and III
   C) I and II

12. Economies of scale occur when
   A) total cost falls as output increases.
   B) average cost falls as output increases.
   C) the cost curve shifts as output increases
   D) all of the above.

13. Authors typically prefer lower book prices than publishers because:
   A) authors are more sympathetic to the budget issues faced by students.
   B) authors maximize revenue, while publishers maximize profit.
   C) authors do not bear the cost of producing the extra books that would be sold at the lower price.
   D) Both b and c (many authors write books that are not purchased by students)

14. At the current level of output of 100 units, the average variable cost is $15, the average cost is $20, marginal cost is $18, and all fixed costs are sunk. The firm can sell any amount it chooses to at a price equal to $18, but it can sell nothing at any higher price. Which statement(s) is (are) correct, if any?
   A) This firm should shut down immediately.
   B) This firm should raise its price at least to the level of its average cost.
   C) This firm is currently maximizing profit and should do nothing differently.
   D) This firm should increase its output.
   E) This firm should decrease its output

15. When the number of firms producing and selling product X increases, the market supply curve shifts
   A) shifts to the right.

15. When the number of firms producing and selling product X increases, the market supply curve shifts
A) shifts to the right.
B) shifts to the left.
C) does not shift because supply is the same as the marginal cost curve.
D) none of the above

16. In order to produce good X efficiently, it is necessary to use a chemical process that was invented by Smith, Inc. Smith, Inc. holds the patent on this process. They can decide whether to sign a licensing agreement to permit a firm that produces good X to use the chemical process. Smith, Inc, is currently the only firm that produces good X. Does this market have free entry?
A) no, because Smith, Inc is a monopolist
B) no, because the technology is not freely available
C) This market could have free entry if Smith, Inc. announced that it would sign a licensing agreement with any firm that applies. If this happened, any firm could use the chemical process if they pay an annual fee to Smith, Inc. of $5million.
D) both B and C

17. In long-run equilibrium with free entry:
A) the equilibrium price must equal the minimum average total cost.
B) profit is equal to zero.
C) each active firm must produce at its efficient scale of production .
D) All of the above

18. Which of the following is a reason that the long-run supply curve may not be flat and may instead be upward-sloping?
A) Entry is limited.
B) Firms are different (i.e., some have lower costs than others).
C) Input prices increase with output.
D) All of these.

19. In the long run, what cost measure is minimized?
A) Average cost.
B) Labor supply costs.
C) Marginal cost.
D) Total cost.

20. What is true about the individual firm demand curve that each firm faces in a competitive market?
A) It is downward-sloping.
B) It is horizontal.
C) It is upward-sloping.
D) It is vertical.

21. What is the potential advantage of a patent system?
A) It drives the price of the good produced to the competitive market equilibrium.
B) It eliminates a monopoly.
C) It encourages innovation.
D) It raises the level of output of the good.

22. In general, the mark-up charged by monopolists is higher when which of the following properties holds?
A) Demand for the good is highly elastic.
B) Demand for the good is highly inelastic.
C) The price is lower.
D) There are close substitutes for the good produced by the monopolist.

Answer the following questions:

D) There are close substitutes for the good produced by the monopolist.

Answer the following questions:

23. Consider the production function $f(L,K) = 2L^{1/4}K^{1/4}$.
A) Find the associated (long run) total, average, and marginal cost curves.
B) Sketch the total, average, and marginal cost curves.

(A) We Assume the wage rate is w and the rental rate of capital is r

so $TC = wL + rK$

given a Q, we have: $\frac{\partial Q}{\partial L} / \frac{\partial Q}{\partial K} = P_K/P_L$,

$\Rightarrow \frac{\frac{1}{2}L^{-3/4}K^{1/4}}{\frac{1}{2}L^{1/4}K^{-3/4}} = \frac{K}{L} = \frac{w}{r}$

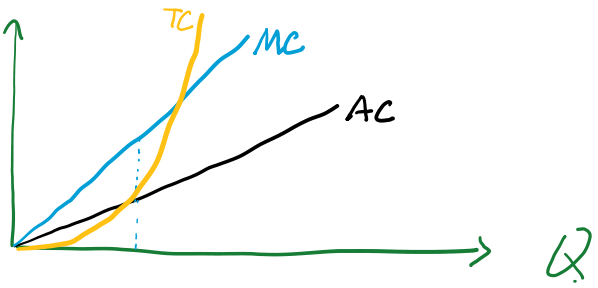
So $L = \frac{1}{4}\sqrt{\frac{r}{w}}\,Q^2$; $K = \frac{1}{4}\sqrt{\frac{w}{r}}\,Q^2$

So. we have:

$TC = \frac{1}{4}Q^2\sqrt{wr}$ $\quad AC = TC/Q = \frac{1}{4}Q\sqrt{wr}$

$MC = \frac{dTC}{dQ} = \frac{1}{2}Q\sqrt{wr}$

(2)



24. Han Meimei owns a coffee factory in Argentina. His production function is:
$F(K, L) = (K - 1)^{1/4} L^{1/4}$
Consider the cost of capital to be r>0 and the wage to be w>0. Both inputs are variable, and Han Meimei faces no fixed costs.

= MRTS for labor with capital

A) What is the MRTS of labor for capital?
B) What are Han Meimei's input demands, conditional on the quantity (q) he wants to produce? [Hint: Treat w and r as parameters.]
C) Show that Han Meimei's long run cost function is $C(q) = r + 2(wr)^{1/2}q^2$.
D) What is the supply function of Han Meimei's firm?

Consider now that r = 4,w = 1, and that the market demand for coffee is $Q^d = 20 - P$. There are 7 other companies operating in this market, all with cost structures identical to Han Meimei's company.

E) What is the aggregate supply in this market?
F) Calculate the equilibrium price, aggregate quantity sold, quantity sold by each firm, and economic profit of each firm.
G) Can this be a long run equilibrium? Why? How will the supply side of the market adjust in the long run?
H) What is going to be the price in the long run? How many firms will be present in this market in the long run? How much will each firm produce?

(A) MRTS $= \frac{MP_L}{\quad} = \frac{\frac{1}{4}(K-1)^{1/4}L^{-3/4}}{\quad} = \frac{(K-1)}{L}$

(A) $MRTS_{LK} = \frac{MP_L}{MP_K} = \frac{\frac{1}{4}(K-1)^{1/4} L^{-3/4}}{\frac{1}{4}(K-1)^{-3/4} L^{1/4}} = \boxed{\frac{(K-1)}{L}}$

(B) $MRTS_{LK} = \frac{w}{r} = \frac{K-1}{L}$

$\therefore L = Q^2\sqrt{\frac{r}{w}}$; $K = 1 + Q^2\sqrt{\frac{w}{r}}$

(C)

$C = wL + rK = Q^2\sqrt{wr} + r + Q^2\sqrt{wr}$

$= r + 2\sqrt{wr}\,Q^2$

(D)

$MC = \frac{\partial C}{\partial Q} = 4\sqrt{wr}\,Q \Rightarrow P = 4\sqrt{wr}\,Q^S$

$AC = \frac{C}{Q} = 2\sqrt{wr}\,Q + \frac{r}{Q}$

now $MC = \delta Q_0 \Rightarrow P = \delta Q_0^S$

$AC = \frac{4}{Q_0} + 4Q_0$, $AC_{min} = 8$

(E)

let $\delta Q^S = Q_t^S = Q^d \Rightarrow P = 20 - P \Rightarrow P = 10$

$\Rightarrow Q_t^S = Q^d = \boxed{10}$

(F)

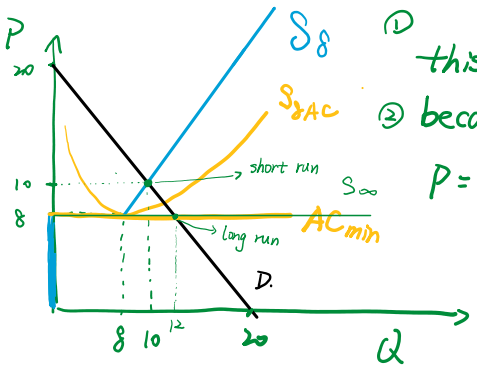
$P = 10$. $Q^{sold} = 10$ $Q_{each}^{sold} = 1.25$

$profit_{each} = P \times Q_{each}^{sold} - C(Q_{each}^{sold})$

$= 12.5 - 4 - 4 \times 1.25^2 = 8.5 - 1.25 \times 5 = 2.25$

(G)

P_{20} ↑ / S_8 ① this can not be a long run equilibrium



① this can not be a long run equilibrium

② because if it is "free-entried" $P = AC_{min}$ but it is not equal yet.

③

There will be more firm entrying in the market, the supply curve will be a horizonal line as S_∞ in left graph. and $Q^s_{market} = Q^d_{market} = 12$. total number of firms is 12

(H) $P = 8$ Number of firms : 12. each firm produces 1

25. A monopoly faces market demand $Q = 30 - P$ and has a cost function $C(Q) = Q^2/2$

A) Find the profit maximizing price and quantity and the resulting profit to the monopoly.

Profit $U = P \cdot Q - C(Q)$

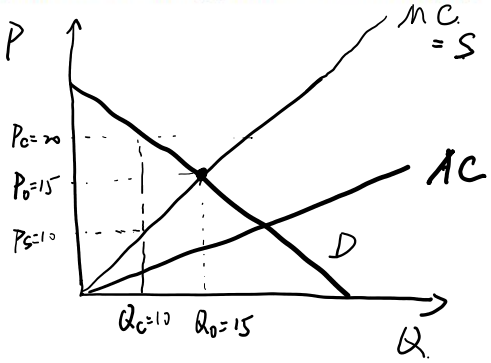
$= (30 - Q)Q - Q^2/2$

make U maximum.

let $\frac{dU}{dQ} = 0 \Rightarrow 30 - 3Q_c = 0$ $Q_c = 10$

then price $P_c = 20$

and the $U_{max} = 200 - 50 = 150$



B) What is the socially optimal price? Calculate the deadweight loss (DWL) due to the monopolist behavior of this firm. Calculate consumer surplus (CS) and producer surplus (PS). Show CS, PS, and DWL on the diagram.

C) Assume that the government puts a price ceiling on the monopolist at P = 18. How much output will the monopolist produce? What will be the profit of the monopolist? Calculate CS, PS, and DWL. Why is the deadweight loss different now?

D) Assume that the government put a price ceiling on the monopolist in order to maximize the total (i.e. consumer plus producer) surplus. What price ceiling should it choose? How much output will the monopolist produce at this price ceiling? What will the profit of the monopolist be? What is the DWL?

(B)

$MC = \frac{dC}{dQ} = Q^S$ let $Q^S = Q^d \Rightarrow P_0 = 15$, $Q_0 = 15$

$AC = \frac{1}{2}Q$

So the socially optimal price is 15

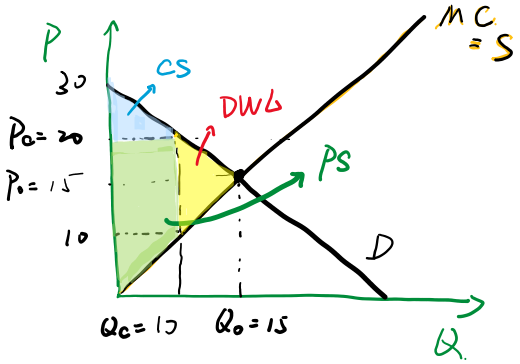
MC = 2Q

So the socially optimal price is 15

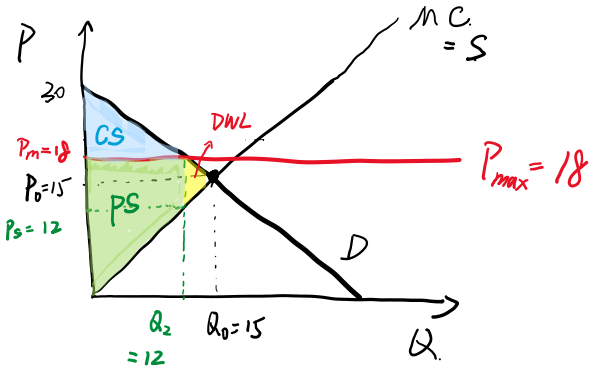
$DWL = \frac{1}{2}(Q_0 - Q_c) \times \Delta P = \frac{1}{2} \times 5 \times 10 = 25$

CS = 50

PS = 150



(C)



$U_{com} = P_2 Q_2 - C(Q_2)$

$= 18 \times 12 - \frac{12^2}{2} = 144 = PS$

CS = 72. DWL = 9

Because, government sets a max price, 18.

and let the practise price nearer to the socially optimal price 15

the aggregate surplus increases, so the DWL decreases

(D) choose 15, the socially optimal price.

$Q_3 = Q_0 = 15$

$U_3 = 112.5$, DWL = 0