

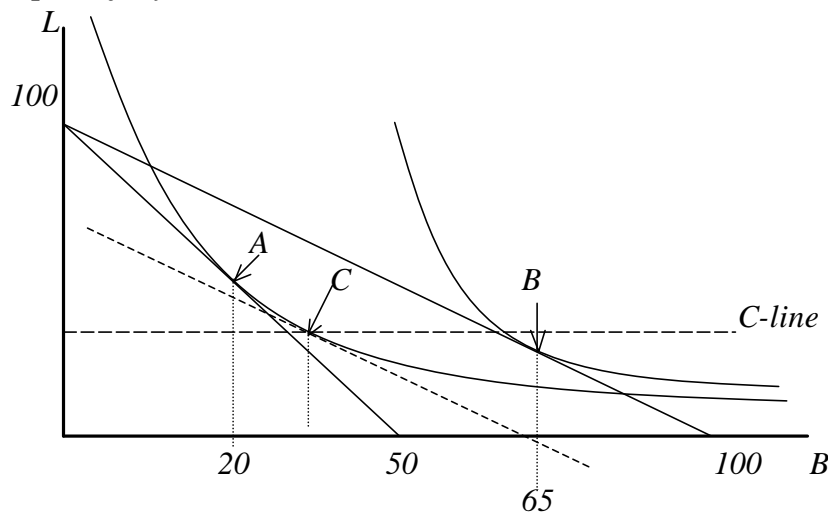
Clearly label all graphs for full credit
 and please write legibly; I cannot grade what I
 cannot read.

Number of points each question is worth in parentheses.

1. Curley consumes two goods, Limburger Cheese, L, and Bandages, B. The price of Limburger cheese is \$1 and the price of Bandages is \$2. Curley's income is \$100.

- a. (6) Below, with BANDAGES ON THE X-AXIS, draw in Curley's budget constraint and an indifference curve that assumes he starts out consuming 20 bandages.

Anything in italics is part of my answer



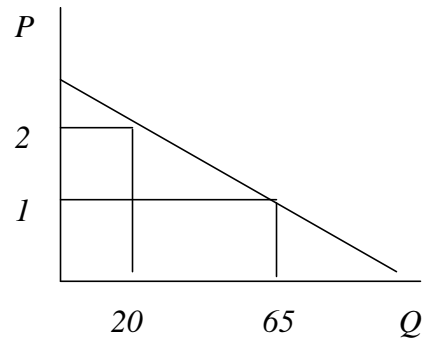
- b. (14) Now assume the price of bandages falls to \$1.

TRUE / FALSE / IT DEPENDS: If **Limburger Cheese** is an inferior good, then bandages must be inferior.

Verbally and using the graph, demonstrate and explain how you arrived at your answer. The more complete your answer, the better your score (that is, convince me you really understand what is going on here).

*False. When the price changed, the substitution effect was for Curley to change his optimal bundle from bundle A to C. The income effect would move him to a point on the new budget constraint. Since price of bandages fell, Curley's income effect will have the effect of making him feel richer. The change in his purchasing power is reflected in a move from the dotted, "compensated" budget line to the new one. As Limburger cheese is inferior, the final bundle will have to contain less L than bundle C. As the new bundle has to contain less L-cheese, it will be below the dotted "C-line." On the new budget line, only bundles with more Bandages than in bundle C also contain less L-cheese. As this means Bandage consumption must rise with purchasing power, Bandages **MUST** be normal.*

- c. (4) Using information from the graph in part B, draw the demand curve for Bandages.



- 2.(6) True/False/It depends: For normal goods, the substitution effect always has the opposite sign as the price change and for inferior goods the substitution effect has the same sign as the price change. Explain (it might help to use a graph, but one is not necessary).

Whether the good is normal or inferior, the substitution effect always has the opposite sign as the price change. The reason is that the substitution effect is the move along the original indifference curve to a point where the MRS is equal to the new price ratio (p_x/p_y). When the price of X (on the horizontal axis) goes up, the budget constraint gets steeper. To find a place on the indifference curve that is steeper, the move has to be to the northwest of the original point, which contains less X. The opposite is true for a price decrease.

3. (6) True/False/It depends: A change in fixed cost will not affect the firm's output decision in the short run unless the change is great enough to cause the firm to shut down. Explain your answer.

False. While it is true that a change in the fixed cost will not affect the firm's output decision in the short run, it is false that there could be a great enough change that might cause the firm to shut down. Firms will shut down when $Loss > FC$. When FC rises, the loss rises with the FC so the difference between the loss and the FC remains constant. So if FC started at \$2000 and the firm's loss was \$1000, they should not shut down. If FC increased by \$5000, to \$7000, the loss would increase by \$5000, to \$6000 as well and the firm should still continue to produce.

4. Use the following production function to answer parts a-c. Assume that the firm can only use whole units of capital and labor and the price of capital is \$10 and the price of labor is \$30.

Production Function									
		Capital							
		1	2	3	4	5	6	7	8
Labor	1	20	45	65	82	94	100	105	106
	2	50	80	110	130	150	170	190	195
	3	75	120	165	190	220	250	285	300
	4	95	150	225	265	300	340	385	410
	5	110	170	265	345	400	440	500	530
	6	120	185	285	400	510	550	625	660
	7	125	195	300	450	600	670	765	800
	8	126	200	310	480	660	770	900	950

a. (4) If the firm is using four units of capital, at what point does diminishing marginal return of labor set in?

Laborer #6 adds less to output than laborer #5.

b. (4) If using three units of capital, what is the marginal cost if production increases from 265 to 285?

That change in output requires one more laborer, which costs \$30. Since $MC = \frac{\text{change in total cost}}{\text{change in output}}$, $MC = \frac{30}{20} = \$1.50$.

c. (8) If using three units of capital, why would we expect to see a U-shaped MC curve? And between what levels of output would the MC curve “bottom out?”

Because production exhibits increasing and then decreasing marginal returns. This means when the company first adds labor, they need to add decreasing amounts of labor to produce additional units (MC falls) but then after a point, they need to start adding increasing amounts of labor to increase output by one unit, so MC rises.

d. (4) If producing 400 units of output with five units of capital and five units of labor, what is the MRTS?

$MRTS = MPL/MPK$, At $L=5$ and $K=5$, $MPL = 110$ and $MPK = 40$, so $MRTS = 110/40 = 11/4$.

e. (4) If producing 400 units of output with five units of capital and five units of labor, is the firm experiencing increasing, decreasing, or constant returns to scale? Explain how you know.

By increasing L and K to 6 units, inputs will be increased by 20%. By doing that, output will increase from 400 to 550, a 37.5% change. As the % change in output was higher than the % change in inputs, we have Increasing Returns to Scale.

f. (6) If producing with four units of capital and two units of labor, is the firm minimizing cost? If so, how do you know, if not, should they be using more capital and less labor OR less capital and more labor and how do you know that?

Calculating MRTS as was done above, we find the MRTS is 3 with this level of L and K . As the price ratio, $PL/PK = 30/10$, or 3, we see that the $MRTS = PL/PK$ and the firm is minimizing cost of producing 130 units of output.

5. Your friend Carl Keyneslot owns his own business unclogging people's toilets. His total weekly costs are illustrated in the table below. He has asked you for help in maximizing his profit. Since he operates in a perfectly competitive market, he can only charge the market price of \$50 per visit. (I have provided extra columns to help you work out the numbers you will need. I just added as many columns as would fit, you probably won't need that many).

Carl's fixed cost is made up of a long-term lease on equipment (\$200/week) and an annual city permit that costs \$200/week.

Q	TC	mc	mr	tr	profit		
0	400						
1	452	52	50				
2	487	35	50				
3	512	25	50				
4	532	20	50				
5	555	23	50				
6	586	31	50				
7	630	44	50	350	-280		
8	693	63	50				
9	778	85	50				
10	891	113	50				

- a. (6) What is Carl's profit maximizing level of output and profit in the Short Run?

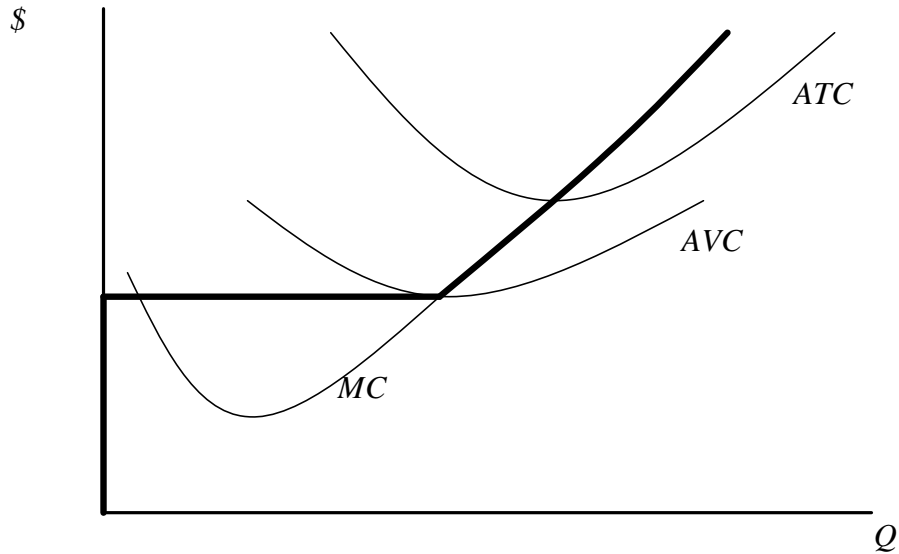
The 7th unit is the last one for which $MR > MC$ so he will maximize profit by producing 7 units of output. At that level, profit will be \$-280.

As FC is \$400, he should continue to produce since shutting down would cost more than producing 7 units of output.

- b. (6) How would your answer change if you knew that while the city permit has to be renewed once per year, it can be cancelled with one days notice if he decides to stop producing. Using numbers from the table above, describe how you would explain to Carl how this cancellation policy should affect his options and decision.

Now, only \$200 of the fixed cost would have to be paid if he shut down. This is better than losing \$280 and he should shut down.

6. (12) Using the standard short-run cost curve graph (AVC, ATC and MC) for a firm, create and describe completely a firm's short run supply curve. That is, why is the firm supply curve what it is and why does it look the way it does (you might want to use different prices to illustrate the different possible firm supply responses)?



The heavy line is the firm's short run supply curve. Above AVC, it follows the MC curve because firms produce a quantity where $P = MC$. Since the definition of a supply curve is the Q supplied at each price, and the MC curve tells the firm the level of output they should produce to maximize profit at each price, the MC curve is the firm's supply curve.

When the price drops below AVC, the firm is no longer covering its variable cost and it should shut down ($Q_s = 0$) to minimize its loss.

7. (10) In one of the Hazlitt chapters he discusses the role of prices and in another he discusses profit. In Hazlitt's mind, in what way do prices and profits serve the same function in a market economy. Give an example to illustrate your point.

Firms chase profits. If a firm thinks that they can produce the good with an ATC below that market price, they will enter the industry and earn a profit. When the price is high enough that firms can make a profit (>0) it means that not enough resources are devoted to producing that good. When firms enter an industry, they bring more resources to the industry. If an industry is producing a good few people want any more, price will fall, and profits will fall, signaling to producers that they resources they are using would generate more value to society by being used in another industry. Negative profits are the motivation for firms to leave industries.

3. Assume the Suppose Spiffy Car Wash is going to try advertising on city buses. They need to decide how many city buses should carry an advertisement for their car wash next month.

a. (7) If the price of a car wash is \$10, on how many buses should Spiffy Carwash rent advertising space?

# buses	total ad cost		Qd Car washes		
0	0		600		
1	200		700		
2	400		785		
3	600		855		
4	800		910		
5	1000		950		
6	1200		980		
7	1400		1000		
8	1600		1015		
9	1800		1025		

b. (3) How would your answer change if the City Bus Advertising Department charged a \$1000 set-up fee on top of the cost per bus illustrated in the chart above? Explain why.