



Complete each of the following. Show your work. 

1. Assume the total cost for a firm is \$120 and the average variable cost is \$15 when it produces 6 units. Calculate the average fixed cost.  
Average fixed cost = \$5. Average total cost = Total cost/quantity =  $\$120/6 = \$20$ . The average variable cost is given \$15. Average fixed cost = average total cost - average variable cost =  $\$20 - \$15 = \$5$ .
2. Assume a firm in a perfectly competitive market is producing the profit maximizing quantity and earning \$400 of total revenue. If the fixed cost increased by \$10 and the quantity is 80 units, how much is the marginal cost? Marginal cost = \$5. Total revenue = price x quantity. If the total revenue is \$400 then  $\$400/80$  is the price of \$5. In perfect competition, a firm maximizes profit at  $MR=MC$  and the price = MR, therefore, the price = MC. Since the price is \$5, the marginal cost is \$5. The change in fixed cost is erroneous information.
3. Suppose a firm is earning \$300 of total revenue. If the average total cost is \$25 and price is \$30, how much is the total profit or loss? Total profit = \$50. Total profit = total revenue - total cost. Total revenue = price x quantity. Since the total revenue is \$300 and the price is \$30, the quantity must be 10. Total cost =  $ATC \times Q = \$25 \times 10 = \$250$ . Total profit =  $\$300 - \$250 = \$50$ .
4. Suppose a firm in a perfectly competitive market is selling 12 units at a price of \$8 each. If the total fixed cost is \$24 and the average variable cost is \$4, how much is the total profit or loss? Total profit = \$24. Total profit = total revenue - total cost. Total revenue =  $P \times Q = \$8 \times 12 = \$96$ . Total cost = fixed costs + variable costs =  $\$24 + \$48 = \$72$  (the variable cost is the quantity of 12 times the AVERAGE variable cost of \$4). Profit =  $TR - TC = \$96 - \$72 = \$24$ .

Use the graph to the right to complete questions 5-9.

5. Calculate the consumer surplus before the tax. Consumer surplus = \$90.  
 $CS = 1/2bh = 1/2 (30)\$6 = \$90$
6. Calculate the consumer surplus after the tax. Consumer surplus = \$50.  
 $CS = 1/2bh = 1/2 (25)\$4 = \$50$
7. Calculate the deadweight loss after the tax, assuming no externalities.  
Deadweight loss = \$10.  $DWL = 1/2bh = 1/2 (5)\$4 = \$10$
8. Calculate the elasticity of supply coefficient from moving from \$8 to \$10. Elasticity of Supply = +.8. Elasticity of Supply = (% Change in Quantity Supplied) / (% Change in Price) =  $((Q2 - Q1) / Q1) / ((P2 - P1) / P1) = ((30 - 25) / 25) / ((\$10 - \$8) / \$8) = (20\%) / (25\%) = 0.8$ .
9. Assume instead that the demand was vertical at quantity 25. Calculate the elasticity of demand coefficient from moving from \$8 to \$12. Elasticity of Demand = 0 (zero). Elasticity of Demand = (% Change in Quantity Demanded) / (% Change in Price). Percent change in quantity is 0% and the percent change in price is 50%.  $0\% / 50\% = 0$ . The demand is perfectly inelastic.
10. Assume the price of bread increased from \$4 to \$6 causing the quantity demanded of bread to decrease from 20 to 16. Calculate the elasticity of demand coefficient. Elasticity of Demand = -0.4. Elasticity of Demand = (% Change in Quantity Demanded) / (% Change in Price). % Change in Quantity Demanded is  $[(16-20)/20] \times 100\% = -20\%$ . Percent change in price is  $[(6-4)/4] \times 100\% = 50\%$ .  $(-20\%/50\%) = -0.4$ .
11. Assume the price of bread increased from \$5 to \$6 causing the quantity demanded of butter to decrease from 20 to 15. Calculate the cross price elasticity of demand coefficient for butter. Cross price elasticity coefficient = -1.25. % $\Delta Q_d$  of butter =  $((Q2 - Q1) / Q1) \times 100 = ((15 - 20) / 20) \times 100 = -25\%$ . % $\Delta$ Price of bread =  $((P2 - P1) / P1) \times 100 = ((6 - 5) / 5) \times 100 = 20\%$ . Cross price elasticity of demand coefficient =  $(\% \Delta Q_d \text{ of butter} / \% \Delta \text{Price of bread}) = (-25\% / 20\%) = -1.25$ . (notice that answer is NEGATIVE)
12. If income increased 10% causing the quantity demanded to increase from 12 to 15, what is the income elasticity of demand coefficient? Income Elasticity of Demand = 2.5. Income elasticity of demand coefficient = (% $\Delta Q_d$  of quantity / % $\Delta$  in price). The percent quantity in quantity is 25%.  $(15 - 12) / 12 \times 100 = 25\%$ . The percent change in income was given as 10%.  $25\% / 10\% = 2.5$ .
13. Assume a profit maximizing firm utilizes labor and capital. If the marginal product of labor is 10, the marginal product of capital is 20, and the price of labor is \$20, what is the price of capital? Price of capital is \$40. The least cost rule is  $(MP \text{ labor} / \text{Price labor} = MP \text{ capital} / \text{Price capital})$ . Substituting the given values:  $10 / 20 = 20 / \text{price of capital}$ . Price of capital =  $(20 \times 20) / 10 = \$40$ .
14. Assume Bob is maximizing his utility from consuming tacos and burritos and the price of a taco is \$2 and the price of a burrito is \$5. If Bob's marginal utility from the last burrito is 20, what is his marginal utility from the last taco? Marginal utility from the last taco = 8. The utility maximizing rule is  $(MU \text{ tacos} / \text{Price tacos} = MU \text{ burritos} / \text{Price burritos})$ . Substituting the given values:  $MU(\text{taco})/2 = 20/5$ .

