

2. The table provided shows the short-run production function for Lowen Feline, a profit-maximizing firm that produces cat food.

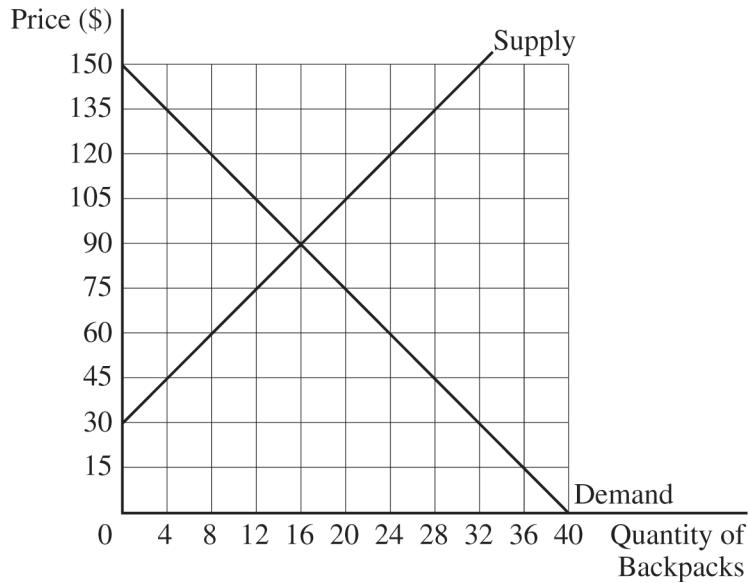
Number of Workers	Total Quantity of Cat Food (bags)
0	0
1	5
2	12
3	18
4	23
5	27
6	30
7	32
8	33
9	32

Lowen Feline sells as many bags of cat food as it wants at a market price of \$10 per bag and hires as many workers as it wants at a market wage of \$18.

- (a) Lowen Feline's fixed cost is \$90. Calculate the average fixed cost if Lowen Feline hires 6 workers. Show your work.
- (b) Assume labor is the only variable input to Lowen Feline. Calculate the marginal cost if Lowen Feline increases output from 27 to 30 units. Show your work.
- (c) With the hiring of which worker do diminishing marginal returns begin? Explain using numbers.
- (d) Determine the profit-maximizing number of workers Lowen Feline will hire. Explain using marginal analysis.
- (e) In the long run, a rival company, Gato Food, increases its production from 40 to 50 units, and its total cost increases from \$600 to \$900. Over the output range of 40 to 50 units, is Gato Food experiencing economies of scale, diseconomies of scale, or constant returns to scale? Explain using numbers.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

3. Backpacks are produced in a perfectly competitive market that has no externalities. The provided graph shows the market supply and demand curves for backpacks in the country of Jambo.



- (a) Calculate total economic surplus at the market equilibrium. Show your work.
- (b) To decrease the price of backpacks for students, the government of Jambo has decided to set a price ceiling of \$60 per backpack. Compared to the market equilibrium, will the quantity of backpacks purchased increase, decrease, or not change as a result of the price ceiling? Explain.
- (c) Suppose instead the government of Jambo provides a per-unit subsidy of \$30 to the sellers of backpacks.
- (i) Identify the price paid by consumers per backpack after the per-unit subsidy is implemented.
 - (ii) Calculate the total cost of the subsidy to the government. Show your work.
 - (iii) Does the per-unit subsidy cause deadweight loss to increase, decrease, or remain the same compared to the market equilibrium in part (a)? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

Question 2: Short**5 points**

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- (a) Calculate the average fixed cost of \$3 and show the work. **1 point**

$$\text{Average Fixed Cost} = \frac{\text{Total Fixed Cost}}{\text{Quantity of Output}}$$

$$\text{Average Fixed Cost} = \frac{\$90}{30} = \$3$$

- (b) Calculate the marginal cost as \$6 and show the work. **1 point**

$$\text{Marginal Cost} = \frac{\text{Change in Total Variable Cost}}{\text{Change in Output}}$$

$$\text{Marginal Cost} = \frac{(\$108 - \$90)}{(30 - 27)} = \frac{\$18}{3} = \$6$$

OR

$$\text{Marginal Cost} = \frac{\text{Change in Total Cost}}{\text{Change in Output}}$$

$$\text{Marginal Cost} = \frac{(\$198 - \$180)}{(30 - 27)} = \frac{\$18}{3} = \$6$$

- (c) State that diminishing marginal returns to labor begin with the hiring of the 3rd worker **1 point**

and explain that the marginal product of the 1st worker is 5 bags, the marginal product of the 2nd worker increases to 7 bags, and the marginal product of the 3rd worker decreases to 6 bags.

- (d) State that the profit-maximizing number of workers is 7 and explain that the marginal revenue product (MRP) of the 7th worker (\$20) is greater than the marginal factor cost (MFC) of the 7th worker (wage = \$18), and that the hiring of the 8th worker would decrease profits because the MRP of the 8th worker (\$10) is less than the MFC of the 8th worker (wage = \$18). **1 point**

- (e) State that Gato Food will experience diseconomies of scale and explain that as output increases from 40 to 50 units, long-run average total cost increases from \$15 to \$18 per unit. **1 point**
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Total for question 2 5 points