1. Following graduation, you move to Bermuda and open a boat cleaning business. Consider the following data describing the product of labor for your business in the short-run. Assume that labor is your only variable input, and that there is a fixed amount of other inputs.

<table>
<thead>
<tr>
<th>#of workers (L)</th>
<th>Total Product (Q) = number of boats/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>16</td>
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<td>3</td>
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<td>4</td>
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<tr>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>40</td>
</tr>
<tr>
<td>7</td>
<td>38</td>
</tr>
</tbody>
</table>

a. What conclusions can you make about how many workers you will hire? Explain.
b. Where is the point of diminishing marginal returns? Explain.
c. Why do marginal returns tend diminish in the short-run?

2. Does the law of diminishing marginal returns hold in the "long run"? Explain.

3. Carefully explain the differences between the following: "accounting profit", "economic profit", and "normal profit". Which type profit is likely to be the largest? Explain.

4. Carefully explain why both short run and long run cost curves tend to be "U-shaped". (Hint: the reason is different for the short run and the long run.)

5. Economic costs include:
   A. Explicit costs only
   B. The costs of purchased inputs only
   C. The costs of purchased and non-purchased inputs
   D. Accounting costs and opportunity costs
   E. Implicit costs and explicit costs
   F. C, D, and E are true

6. Which of the following is the best description of economic profits?
   A. Total costs minus total revenues
   B. Total revenue minus explicit costs
   C. Total revenue minus explicit costs and implicit costs
   D. Total revenue minus accounting costs
7. Assume that after graduation you decide to open your own economics consulting firm. In doing so you give up the opportunity to work for Megabank financial services, where you would have been earning $45,000 per year. In order to start your firm, you withdraw $20,000 from a low-risk account that was earning 8% interest annually. After a year of operations, you have the following information regarding costs and revenues.

Revenue = $170,000 (1700 hours of consulting at a price of $100 per hour)
Labor expenses = $20,000
Rent = $18,000
Other expenses = $15,000

A. How much are your accounting costs? _______________
B. How much are your economic costs? _______________
C. How much are your accounting profits? _______________
D. How much are your economic profits? _______________
E. How much is the normal profit for your firm? _______________

8. Lara's interior designs sells 500 hours of consulting services at $50.00 per hour in 1999. The explicit costs associated with providing this amount of consulting is $10,000. Laura's economic profits for 1999:
A. Equal $25,000
B. Equal $20,000
C. Equal $15,000
D. Cannot be determined without more information

9. You are the owner and only employee of a company that writes computer software that is used by doctors to bill patients. Last year you earned a total revenue of $90,000. Your costs for equipment, rent and supplies were $60,000. To start this business you quit a job at another computer software firm that paid $40,000 a year. A yearly normal profit for your computer software firm would be
A. $20,000.
B. $40,000.
C. $60,000.
D. $100,000.

10. Which of the following is a correct statement about the relationship between the average product of labor (AP_L) and the marginal product of labor (MP_L)?
A. If AP_L exceeds MP_L, then AP is falling.
B. If AP_L = MP_L, then total product is at a maximum.
C. If TP_L is declining then AP_L is negative.
D. If AP_L is at a maximum, then MP_L is also.

True or false:
11. _____ If a firm makes an economic profit greater than zero, it is making more than the normal profit.
12. _____ If the 3rd worker adds 5 units of output to total production and the 4th worker adds 6 units of output to total production, then the firm is past the point of diminishing marginal returns.
13. _____ Assume that at current levels of input use the MPL = 10 units per hour and the MPK = 16 units per hour. If the price of labor is $10.00 per hour and the price of capital is $8.00 per hour, then the firm should use more capital and less labor to increase profits.
14. Technology | Units of capital | Number of employees  
--- | --- | ---  
A | 16 | 8  
B | 12 | 12  
C | 8 | 20  
D | 6 | 24  

If the hourly wage rate is $10 and the hourly price of capital is $50, which production technology should be selected?  
A. A  
B. B  
C. C  
D. D  

Use the following graph for questions 15 - 18.

15. The marginal product of the 2\textsuperscript{nd} unit of labor is:  
A. 2  
B. 3  
C. 5  
D. 7  

16. Diminishing marginal returns set in:  
A. After the 1\textsuperscript{st} unit of labor  
B. After the 2\textsuperscript{nd} unit of labor  
C. After the 3\textsuperscript{rd} unit of labor  
D. After the 4\textsuperscript{th} unit of labor  
E. After the 5\textsuperscript{th} unit of labor  
F. Never  

17. Which of the following statements is true regarding the hiring for this firm?  
A. This firm should not hire the 2\textsuperscript{nd} worker  
B. This firm should not hire the 3\textsuperscript{rd} worker  
C. This firm should not hire the 4\textsuperscript{th} worker  
D. This firm should not hire the 5\textsuperscript{th} worker  
E. We cannot make any conclusions about hiring without more information
18. Which of the following is true between 0 and 3 workers?
   A. Total product is increasing at an increasing rate, so marginal product is positive and rising.
   B. Total product is increasing at an decreasing rate, so marginal product is positive and falling.
   C. Total product is decreasing at an increasing rate, so marginal product is positive and rising.
   D. Total product is decreasing at an decreasing rate, so marginal product is negative and rising.
   E. Total product is decreasing at an increasing rate, so marginal product is negative and falling.

19. Which of the following is true regarding the shape of short-run cost curves?
   A. Short-run cost curves are always downward sloping because productivity decreases in the short run.
   B. Short-run cost curves are always upward sloping because productivity decreases in the short run.
   C. Short-run cost curves are usually u-shaped because productivity typically first increases then decreases in the short run.
   D. Short-run cost curves are usually upside-down u-shaped because productivity typically first increases then decreases in the short run.
   E. Short-run cost curves are usually upside-down u-shaped because productivity typically first decreases then increases in the short run.

20. Which of the following statements is TRUE?
   A. The AVC curve has a positive slope throughout.
   B. The AVC cost curve intersects the MC curve at the minimum point of MC.
   C. The MC curve intersects the AVC curve at the minimum point of AVC.
   D. The AVC curve resembles an upside-down U.

21. The Framing Gallery frames posters. The Framing Gallery has total fixed costs of $500. The Framing Gallery's average variable cost is $20 and its average total cost is $25. The Framing Gallery is currently framing
   A. 5 posters.
   B. 25 posters.
   C. 100 posters.
   D. A number of posters that cannot be determined from this information.

22. Fill-in the missing values in the table below:

<table>
<thead>
<tr>
<th>Labor (L)</th>
<th>Output (Q)</th>
<th>Total Fixed Costs</th>
<th>Total Variable Costs</th>
<th>Total Costs</th>
<th>Average Fixed Costs</th>
<th>Average Variable Costs</th>
<th>Average Total Costs</th>
<th>Marginal Costs</th>
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<td>1100</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

True or False:

23. _____ Average fixed costs rise continuously as quantity of output rises.

24. _____ Diminishing marginal returns imply decreasing marginal costs.