1) What characteristic of a good causes, or “is responsible for,” the free rider problem (see Fig. 1-1 on page 227)?

2) Describe how the properties of **excludability** and **rivalry** define differences between private goods, public goods, common resources, and goods produced in “natural monopoly” markets?

3) How could a private firm build and operate a lighthouse for profit? Who would the firm charge and why? Would a private firm be more successful building a lighthouse next to a shipping lane where all ships went to the same port, or next to a shipping lane used by ships going to many different ports? What “good” is being provided by the company which operates the lighthouse?

4) What characteristics subject a good to the problems described in the section on “the tragedy of the commons” (page 234)?

5) Assume each ton of iron produced makes 20 pounds of “muck,” and this cannot be reduced. If the external cost of muck is $2 per pound, how much (per pound of muck) should government charge the firm to eliminate inefficiency of this negative production externality? If the tons of iron output can be measured, but not the amount of muck created, what can government do? How would we show this with a graph?

6) Factories A and B create 10 tons of pollution each. For factory A, the cost of reducing pollution to 9 tons is $4, and to further reduce it to 8 tons costs an additional $7 ($11 in total). For factory B, the cost of reducing pollution to 9 tons is $2, and to further reduce it to 8 tons costs an additional $5 ($7 in total). In order to reduce pollution to 18 tons total from these two factories, government requires each factory to reduce pollution to 9 tons each. Can a scheme including tradable pollution permits achieve the goal of 18 tons of pollution with less total cost than the present policy? Why or why not? What must be true in order for tradable pollution permits to provide a more efficient method of reaching a pollution target than equal limits set on all polluters?

7) Bob’s income increases from $30,000 to $31,000 and his tax liability increases from $3,000 to $3,300. What is Bob’s marginal tax rate (MTR)? What are his average tax rates (ATR) at the original and new income levels?

8) Assume the following income tax structure (similar to Table 12-3, pg. 247)

<table>
<thead>
<tr>
<th>INCOME:</th>
<th>MARGINAL TAX RATE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 - 25,000</td>
<td>15%</td>
</tr>
<tr>
<td>$25,000 - 50,000</td>
<td>28%</td>
</tr>
<tr>
<td>$50,000 +</td>
<td>36%</td>
</tr>
</tbody>
</table>

Calculate the income tax a person earning $100,000 must pay (ignore complications found in the real-world tax code, like deductions, exemptions, and credits). What is their average tax rate?

9) What taxes account for most revenue of - the U.S. government? - State and Local Governments?

10) Which tax would likely be more regressive: i) a sales tax on navy beans or ii) a sales tax on high quality, expensive, wine?

11) When marginal tax rates increase, what happens an individual’s incentive to work and earn income subject to taxation? What happens to the tax base? How is this related to the Laffer Curve presented on page 173?

12) If higher income people pay more dollars in tax than poor, is it still possible for this tax to be regressive?

13) A firm earns $100 in economic profit, its total economic cost = $40 and price of the good it sells = $2. What is output?
14) Fixed Cost (FC) = $5 and Variable Cost (VC) = $20. What is Total Cost (TC)? If output (Q) = 5 units, what are Average Total Cost (ATC), Average Fixed Cost (AFC), and Average Variable Cost (AVC)?

15) Consider the following table of costs:

<table>
<thead>
<tr>
<th>Output (Q)</th>
<th>Total Cost (TC)</th>
<th>Fixed Cost (FC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>$10.80</td>
<td>$6.00</td>
</tr>
<tr>
<td>5</td>
<td>$13.00</td>
<td>$6.00</td>
</tr>
<tr>
<td>6</td>
<td>$15.60</td>
<td>$6.00</td>
</tr>
</tbody>
</table>

What are Average Total Cost (ATC) and Average Variable Cost (AVC) when output is 4; 5; and 6 units? What is Marginal Cost (MC) when output (Q) increases from 4 to 5 units? When (Q) increases from 5 to 6 units?

16) What is true of the ATC curve when MC = ATC? What is true of AVC when MC = AVC? What is the difference: ATC – AVC? What happens to this difference as quantity of output increases (Q↑)?

Note: In chapters 13-17 the text provides examples with tables of data corresponding to the graphs (e.g., Table 13-1 showing the production function graphed in figure 13-2). Students should understand how the data is connected to the graphs. Some questions using production and/or cost functions in table form may be asked.

17) What is the difference between accounting and economic costs? Between explicit and implicit costs? What is fixed cost? When we draw cost curve curves, what kind of costs are we representing?

18) How is the shape of the Production Function (e.g., Figure 13-2) related to the Total Cost Curve (e.g., Figure 13-3)?

19) Name two of the things that are conceptually held constant as we move along a short run total product curve. (Realize output price is not constant -- output price determines the profit maximizing Q to produce, and so amount of labor to hire, and so the point the firm is at on the production function curve and the cost curves).

20) Draw a Long Run Average Total Cost (LRATC) curve (like Figure 13-7). Can economies of scale and diseconomies of scale both be shown on one LRATC curve?

21) Name three reasons why “economies of scale” may exist and one reason why “diseconomies of scale” may exist.

22) Give an example of a Sunk Cost. How is Sunk Cost different than Fixed Cost.

23) Draw a long run average total cost (LRATC) curve assuming constant returns to scale.

24) Show the effect of: i) an increase in the price of inputs; ii) an increase in the taxes placed on a firm; and iii) an improvement in technology on a Total Cost (TC) curve, and on an Average Total Cost (ATC) curve. Which one of the three will also shift the product function curve?

25) Write down a general equation for total cost (TC). Write down the definition for average total cost (ATC). Write down the definition for marginal cost (MC).