1. A firm has fixed costs of $60 and variable costs as indicated in the table.
   1. Graph total fixed cost, total variable cost, and total cost. Explain how the law of diminishing returns influences the shapes of the variable-cost and total-cost curves.
   2. Graph AFC, AVC, ATC, and MC. Explain the derivation and shape of each of these four curves and their relationships to one another. Specifically, explain in nontechnical terms why the MC curve intersects both the AVC and the ATC curves at their minimum points.
   3. Explain how the location of each curve graphed in question 7b would be altered if (1) total fixed cost had been $100 rather than $60 and (2) total variable cost had been $10 less at each level of output.

| **Total Product** | **Total Fixed Cost** | **Total Variable Cost** | **Total Cost** | **Average Fixed Cost** | **Average Variable Cost** | **Average Total Cost** | **Marginal Cost** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **0** | **$\_\_\_** | **$0** | **$\_\_\_** | **$\_\_\_** | **$\_\_\_** | **$\_\_\_** | **$\_\_\_** |
| **1** | **\_\_\_** | **45** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** |
| **2** | **\_\_\_** | **85** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** |
| **3** | **\_\_\_** | **120** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** |
| **4** | **\_\_\_** | **150** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** |
| **5** | **\_\_\_** | **185** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** |
| **6** | **\_\_\_** | **225** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** |
| **7** | **\_\_\_** | **270** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** |
| **8** | **\_\_\_** | **325** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** |
| **9** | **\_\_\_** | **390** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** |
| **10** | **\_\_\_** | **465** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** | **\_\_\_** |

**ROI analysis using DuPont model.**

1. A. Firm D has net income of $27,900, sales of $930,000, and average total assets of $465,000. Calculate the firm's margin, turnover, and ROI.

b. Firm E has net income of $75,000, sales of $1,250,000, and ROI of 15%. Calculate the firm's turnover and average total assets.

c. Firm F has ROI of 12.6%, average total assets of $1,730,159, and turnover of 1.4. Calculate the firm's sales, margin, and net income.

3. Each problem is unrelated to the others.

1. Given: Selling price per unit, $20; total fixed expenses, $5,000; variable expenses per unit, $15.

Find break-even sales in units.

2. Given: Sales, $40,000; variable expenses, $30,000; fixed expenses, $7,500; net income, $2,500.

Find break-even sales in dollars.

3. Given: Selling price per unit, $30; total fixed expenses, $33,000; variable expenses per unit, $14.

Find total sales in units to achieve a profit of $7,000, assuming no change in selling price.

4. Given: Sales, $50,000; variable expenses, $20,000; fixed expenses, $20,000; net income,

$10,000. Assume no change in selling price; find net income if activity volume increases 10%.

5. Given: Selling price per unit, $40; total fixed expenses, $80,000; variable expenses per unit, $30.

Assume that variable expenses are reduced by 20% per unit, and the total fixed expenses are increased by 10%. Find the sales in units to achieve a profit of $20,000, assuming no change in selling price.