Module 16 In Class Exercises

1. **Make or Buy.** ColorPro uses part 87A in the production of color printers. Unit manufacturing costs of part 87A are:

   - Direct materials: $8
   - Direct labor: 211
   - Variable overhead: 1
   - Fixed overhead: 4

ColorPro uses 100,000 units of 87A per year. Filbert Company has offered to sell ColorPro 100,000 units of 87A per year for $10. Fixed overhead is unavoidable. Should ColorPro make or buy the part?

2. **Make or Buy.** Sam’s Manufacturing Company can make 100 units of a necessary component part with the following costs:

   - Direct materials: $80,000
   - Direct labor: 13,000
   - Variable overhead: $40,000
   - Fixed overhead: 35,000

If Sam’s Manufacturing Company purchases the component externally, $20,000 of the fixed costs can be avoided. At what external price for the 100 units is the company indifferent between making or buying?

\[
(80 + 13 + 40 + 20) = 153,000 \text{ or } 1.53 \text{ per unit}
\]

3. **Special Order.** Alderson Industries produces a lighting fixture with the following unit cost:

   - Direct materials: $2
   - Direct labor: 1
   - Variable overhead: 3
   - Fixed overhead: 2

   Unit cost: $8

The production capacity is 300,000 units per year. The company expects to produce only 180,000 fixtures for the coming year. The company also has fixed selling costs totaling $500,000 per year and variable selling costs of $1 per unit sold. The fixtures normally sell for $12 each.

At the beginning of the year, a customer from region outside the area normally served by the company offered to buy 100,000 fixtures for $7 each. The order would not have any variable selling costs. The fixed overhead is unavoidable. If Alderson accepts the special order, by how much will profit increase or decrease?

\[
(7 - 8) \times 100,000 = -100,000
\]

4. **Special Order.** Aerotoy Company makes toy airplanes. One plane is an excellent replica of a 737; it sells for $5. Vacation Airlines wants to purchase 12,000 planes at $1.75 each to give to children flying unaccompanied. Costs per plane are as follows:

   - Direct materials: $1.00
   - Direct labor: 0.50
   - Variable overhead: 0.10
   - Fixed overhead: 0.90

No variable marketing costs would be incurred. The company is operating significantly below the maximum productive capacity. No fixed costs are avoidable. However, Vacation Airlines wants its own logo and colors on the planes. The cost of the decals is $0.01 per plane and a special machine costing $1,500 would be required to affix the decals. After the order is complete, the machine would be scrapped.

Should the special order be accepted?

\[
\text{Yes by } $180,000
\]

\[
\text{But not worth the time to manage!}
\]
5. **Budget Alternatives.** Jegger Co. has 3,000 out-of-style winter hats that cost the company $6,000 to manufacture. If the hats are restyled for $2,500, they can be sold for $5,000. The other alternative is to sell them for scrap for $1,000. Which alternative maximizes pre-tax income?

\[
\text{Restyle: } 2,500 - 6,000 = 2,500 \\
\text{Scrap: } 1,000 \\
\text{So} \quad 1,000 \text{ better to RESTYLE}
\]

6. **Budget Alternatives.** Key Beverage Company plans to eliminate a branch that has a contribution margin of $50,000 and fixed costs of $75,000. Of the fixed costs, $55,000 cannot be eliminated. The effect of eliminating this branch on net income would be:

\[
50,000 - 20,000 = 30,000 \text{ decrease in income}
\]

7. **Budget Alternatives.** AudioMart carries two portable sound systems, System A and System B, and also sells headsets. Variable-costing income statements for the three products follow:

<table>
<thead>
<tr>
<th></th>
<th>System A</th>
<th>System B</th>
<th>Headset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$45,000</td>
<td>$32,500</td>
<td>$8,000</td>
</tr>
<tr>
<td>Less: Variable expenses</td>
<td>(20,000)</td>
<td>(25,500)</td>
<td>(3,200)</td>
</tr>
<tr>
<td>Contribution margin</td>
<td>$25,000</td>
<td>$7,000</td>
<td>$4,800</td>
</tr>
<tr>
<td>Less: Fixed costs</td>
<td>(10,000)</td>
<td>(15,000)</td>
<td>(2,700)</td>
</tr>
<tr>
<td>Operating income</td>
<td>$15,000</td>
<td>$22,500</td>
<td>$2,100</td>
</tr>
</tbody>
</table>

The owner of the store is considering dropping System B. If the product is dropped, sales of System A and headsets will not be affected. The fixed costs cannot be avoided. If System B is eliminated what will happen to AudioMart's operating income?

8. **Sell or Process Further.** Zand Elvira Corporation sells 2,000 units of product Y per day at $2.00 per unit. Elvira has the option of processing the product further for additional costs of $1,000 per day to produce product Z, which sells for $2.80 per unit. If Elvira processes product Y further to produce product Z, the company's net income will:

\[
\text{Increase}\]

9. **Sell or Process Further: Joint Products.** Houston Refinery produces products A, B, C, and D through a joint process. The joint costs prior to split-off amount to $200,000. Each of the products may be sold at split-off or may be processed further to make the product better for customers. Units and costs are as follows:

<table>
<thead>
<tr>
<th>Product</th>
<th>Units Produced</th>
<th>Sales Value at Split-Off</th>
<th>Additional Costs of Processing</th>
<th>Sales Value After Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1,500</td>
<td>$20,000</td>
<td>$5,000</td>
<td>$30,000</td>
</tr>
<tr>
<td>B</td>
<td>2,500</td>
<td>$60,000</td>
<td>$6,000</td>
<td>$70,000</td>
</tr>
<tr>
<td>C</td>
<td>2,000</td>
<td>$40,000</td>
<td>$8,000</td>
<td>$50,000</td>
</tr>
<tr>
<td>D</td>
<td>3,000</td>
<td>$80,000</td>
<td>$12,000</td>
<td>$90,000</td>
</tr>
</tbody>
</table>

Which products should be sold at split-off and which should be processed on.
10. Limited Resources. Canada Production Company has 200 labor-hours available. There is no limit on machine-hours. Canada can sell all of Y it wants, but it can only sell 40 units and 30 units of X and Z, respectively.

<table>
<thead>
<tr>
<th>Product X</th>
<th>Product Y</th>
<th>Product Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contribution margin per unit</td>
<td>$30</td>
<td>$15</td>
</tr>
<tr>
<td>Labor-hours per unit</td>
<td>$4 x 10 = 40</td>
<td>$5 x 8 = 40</td>
</tr>
<tr>
<td>Machine-hours per unit</td>
<td>$10 x 10 = 100</td>
<td>$8 x 10 = 80</td>
</tr>
</tbody>
</table>

How many units of each product should be produced and sold? \( x = 40 \) \( z = 30 \) \( y = 0 \)

11. Equipment Replacement. Atlas, Inc. sells a million units per year of its product for $25. The company purchased an NCL machine 2 years ago for $6 million. The machine was expected to last 6 years and has annual fixed costs of $2 million (including depreciation) and total variable costs of $16 per unit. The current sales value of the old machine is $1 million.

A new NCL machine may be purchased at a cost of $4 million. The new machine is expected to last 4 years and have a zero salvage value. The new machine reduces the fixed operating costs to $1.2 million (including depreciation) and would result in a total unit variable cost of $14.00.

   a. Excluding taxes, should Atlas purchase the new machine?

   \[
   \text{INVEST} \quad \$4,000,000 \\
   \text{Value} \quad (3,000,000)
   \]

   \[
   \begin{align*}
   \text{Savings} & = \text{Fixed op.} \times (1 - 0.25) \times 2,000,000 \\
   & = 800,000 \\
   \text{Variable cost} \times (16 - 14) \times 2,000,000 & = 3,600,000 \\
   \text{Cash inflow} & = \text{INVEST} - \text{Fixed op.} = 3,000,000 \\
   & = 3,000,000 \\
   & = 1,120,000,000 \times 4 \text{ years} \\
   & = 1,776,000,000 \text{ Savings over 4 years}
   \end{align*}
   \]

   b. If taxes are considered with a 40% tax rate, should Atlas purchase the new machine?

   \[
   \begin{align*}
   \text{INVEST} & = \$4,000,000 \\
   \text{Sales} & = 2,000,000 \times 25 = 50,000,000 \\
   \text{Loss} & = 2,000,000 \times 16 = 32,000,000 \\
   \text{Net INVEST.} & = 50,000,000 - 32,000,000 = 18,000,000 \\
   \text{TAXES} & = 18,000,000 \times 0.4 \\
   \text{TAX SAVINGS} & = 7,200,000 \text{ TAXES} \\
   \text{Cash inflow} & = 2,080,000 \times 4 = 8,320,000 \text{ NET CASH}
   \end{align*}
   \]

   Payback = 8.6 years

   c. Recompute (b) considering the present value of money with a required annual return on investment of 10% (PV of $1 per year for 4 years at 10%=$3.16987)?

   \[
   \begin{align*}
   \text{INVEST} & = 1,800,000 \\
   \text{PV} & = 8,320,000 \times 3.16987 = 6,573,330 \\
   \text{NET PRESENT VALUE} & = 6,573,330 - 1,800,000 \\
   & = 4,773,330
   \end{align*}
   \]
Module 16—Review Questions

1. Future costs that differ among competing alternatives are:
   A) Absorption costs
   B) Relevant costs
   C) Replacement costs
   D) Variable overhead costs

2. Which of the following statements is true when making a decision between two alternatives?
   A) Fixed costs are never relevant.
   B) Taxes are never relevant.
   C) Variable costs may not be relevant when the decision alternatives have the same activity levels.
   D) Variable costs are not relevant when the decision alternatives have different activity levels.

3. In deciding whether to sell a joint product or to process it further, any costs incurred prior to the split-off point should be:
   A) Allocated by size of the product
   B) Allocated by weight of the product
   C) Considered as an irrelevant cost
   D) Subtracted from joint revenues

4. Which of the following statements is TRUE?
   A) Products should be selected with the lowest contribution margin per unit of scarce resource.
   B) When considering the replacement of equipment, the amount of investment in the new equipment less the disposal value of the old equipment is considered.
   C) Budget alternatives should be selected such as to maximize unit costs.
   D) A special low price for a new customer, who is a direct competitor to regular customers, does not raise an issue.

5. Strait Company has collected the following information:
   Cost to buy one unit: $48
   Production costs per unit:
   - Direct materials: $22
   - Direct labor: $16
   - Variable manufacturing overhead: $2
   - Total fixed manufacturing overhead: $180,000

   What level of production is needed for Strait to be indifferent between making or buying the part, assuming it can eliminate $130,000 of the fixed costs?
   A) 22,500 units
   B) 16,250 units
   C) 13,000 units
   D) 18,000 units

6. Salvat Co. has capacity of 500,000 units per year, but is currently producing and selling its product at 300,000 units per year. Salvat’s regular sales price is $7.00 each, but is currently considering an order for 100,000 units at a price of $5.00 each. The total budgeted costs are as follows:

<table>
<thead>
<tr>
<th>Units</th>
<th>300,000</th>
<th>400,000</th>
<th>100,000 units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials and Labor</td>
<td>$600,000</td>
<td>$800,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>Production Overhead</td>
<td>600,000</td>
<td>750,000</td>
<td></td>
</tr>
<tr>
<td>Selling and General</td>
<td>600,000</td>
<td>650,000</td>
<td></td>
</tr>
<tr>
<td>Total Costs</td>
<td>$1,800,000</td>
<td>$2,200,000</td>
<td></td>
</tr>
<tr>
<td>Total Costs per Unit</td>
<td>$6.00</td>
<td>$5.50</td>
<td></td>
</tr>
</tbody>
</table>

   The impact on operating income from accepting this order would be:
   A) A $200,000 increase in income
   B) A $300,000 increase in income
   C) A $100,000 increase in income
   D) A $500,000 increase in income
   E) No increase or decrease in income
7. Delta Production Company has 200 machine-hours available. There is no limit on labor hours. Delta can sell all of V it wants, but it can only sell 30 units and 20 units of W and X, respectively.

<table>
<thead>
<tr>
<th>Product</th>
<th>V</th>
<th>W</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contribution margin per unit</td>
<td>$30</td>
<td>$15</td>
<td>$25</td>
</tr>
<tr>
<td>Labor-hours per unit</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Machine-hours per unit</td>
<td>( \frac{10}{2} )</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

How many units of Product V should be produced and sold?

A) 20  
B) 14  
C) 10  
D) 4  
E) 0

Exercise F The Phoenix Company uses a joint process to produce products A, B, C, and D. Each product may be sold at its split-off point or processed further. Joint processing costs for a single batch of joint products are $120,000. Other relevant data are as follows:

<table>
<thead>
<tr>
<th>Product</th>
<th>Sales Value At Split-Off</th>
<th>Additional Processing Costs</th>
<th>Sales Value of Final Product</th>
<th>Additional Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$20,000</td>
<td>$12,000</td>
<td>$48,000</td>
<td>$28,000</td>
</tr>
<tr>
<td>B</td>
<td>24,000</td>
<td>16,000</td>
<td>36,000</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>44,000</td>
<td>28,000</td>
<td>70,000</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>16,000</td>
<td>10,000</td>
<td>32,000</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$104,000</td>
<td>$66,000</td>
<td>$166,000</td>
<td></td>
</tr>
</tbody>
</table>

Determine which of the products should be processed further and which should be sold at split-off.

Process A and D  
S0l0@Sut B & C

SHORT ANSWER
A. What is an opportunity cost?