

Exercise 12-1 (15 minutes)

<i>Item</i>	<i>Case 1</i>		<i>Case 2</i>	
	<i>Relevant</i>	<i>Not Relevant</i>	<i>Relevant</i>	<i>Not Relevant</i>
a. Sales revenue	X			X
b. Direct materials	X		X	
c. Direct labor	X			X
d. Variable manufacturing overhead.....	X			X
e. Book value—Model A3000 machine		X		X
f. Disposal value—Model A3000 machine		X	X	
g. Depreciation—Model A3000 machine		X		X
h. Market value—Model B3800 machine (cost) ..	X		X	
i. Fixed manufacturing overhead.....		X		X
j. Variable selling expense ..	X			X
k. Fixed selling expense	X			X
l. General administrative overhead.....	X			X

Exercise 12-2 (30 minutes)

1. No, the housekeeping program should not be discontinued. It is actually generating a positive program segment margin and is, of course, providing a valuable service to seniors. Computations to support this conclusion follow:

Contribution margin lost if the housekeeping program is dropped			\$(80,000)
Fixed costs that can be avoided:			
Liability insurance	\$15,000		
Program administrator's salary	<u>37,000</u>	<u>52,000</u>	
Decrease in net operating income for the organization as a whole			<u>\$(28,000)</u>

Depreciation on the van is a sunk cost and the van has no salvage value since it would be donated to another organization. The general administrative overhead is allocated and none of it would be avoided if the program were dropped; thus it is not relevant to the decision.

The same result can be obtained with the alternative analysis below:

	<i>Current Total</i>	<i>Total If House- keeping Is Dropped</i>	<i>Difference: Net Operating Income Increase or (Decrease)</i>
Revenues	\$900,000	\$660,000	\$(240,000)
Variable expenses	<u>490,000</u>	<u>330,000</u>	<u>160,000</u>
Contribution margin	<u>410,000</u>	<u>330,000</u>	<u>(80,000)</u>
Fixed expenses:			
Depreciation*	68,000	68,000	0
Liability insurance	42,000	27,000	15,000
Program administrators' salaries	115,000	78,000	37,000
General administrative overhead	<u>180,000</u>	<u>180,000</u>	<u>0</u>
Total fixed expenses	<u>405,000</u>	<u>353,000</u>	<u>52,000</u>
Net operating income (loss)	<u>\$ 5,000</u>	<u>\$(23,000)</u>	<u>\$ (28,000)</u>

* Includes pro-rated loss on disposal of the van if it is donated to a charity.

Exercise 12-2 (continued)

2. To give the administrator of the entire organization a clearer picture of the financial viability of each of the organization's programs, the general administrative overhead should not be allocated. It is a common cost that should be deducted from the total program segment margin. Following the format introduced in an earlier chapter for a segmented income statement, a better income statement would be:

	<i>Total</i>	<i>Home Nursing</i>	<i>Meals on Wheels</i>	<i>House- keeping</i>
Revenues	\$900,000	\$260,000	\$400,000	\$240,000
Variable expenses	<u>490,000</u>	<u>120,000</u>	<u>210,000</u>	<u>160,000</u>
Contribution margin	<u>410,000</u>	<u>140,000</u>	<u>190,000</u>	<u>80,000</u>
Traceable fixed expenses:				
Depreciation	68,000	8,000	40,000	20,000
Liability insurance	42,000	20,000	7,000	15,000
Program administrators' salaries	<u>115,000</u>	<u>40,000</u>	<u>38,000</u>	<u>37,000</u>
Total traceable fixed expenses	<u>225,000</u>	<u>68,000</u>	<u>85,000</u>	<u>72,000</u>
Program segment margins...	185,000	<u>\$ 72,000</u>	<u>\$105,000</u>	<u>\$ 8,000</u>
General administrative overhead	<u>180,000</u>			
Net operating income (loss) .	<u>\$ 5,000</u>			

Exercise 12-3 (30 minutes)

	<i>Per Unit Differential Costs</i>		<i>15,000 units</i>	
	<i>Make</i>	<i>Buy</i>	<i>Make</i>	<i>Buy</i>
Cost of purchasing		\$20		\$300,000
Direct materials	\$ 6		\$ 90,000	
Direct labor	8		120,000	
Variable manufacturing overhead ..	1		15,000	
Fixed manufacturing overhead, traceable ¹	2		30,000	
Fixed manufacturing overhead, common	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total costs	<u>\$17</u>	<u>\$20</u>	<u>\$255,000</u>	<u>\$300,000</u>
Difference in favor of continuing to make the parts		<u>\$3</u>		<u>\$45,000</u>

¹ Only the supervisory salaries can be avoided if the parts are purchased. The remaining book value of the special equipment is a sunk cost; hence, the \$3 per unit depreciation expense is not relevant to this decision.

Based on these data, the company should reject the offer and should continue to produce the parts internally.

	<i>Make</i>	<i>Buy</i>
Cost of purchasing (part 1)		\$300,000
Cost of making (part 1)	\$255,000	
Opportunity cost—segment margin forgone on a potential new product line	<u>65,000</u>	
Total cost	<u>\$320,000</u>	<u>\$300,000</u>
Difference in favor of purchasing from the outside supplier		<u>\$20,000</u>

Thus, the company should accept the offer and purchase the parts from the outside supplier.

Exercise 12-4 (15 minutes)

Only the incremental costs and benefits are relevant. In particular, only the variable manufacturing overhead and the cost of the special tool are relevant overhead costs in this situation. The other manufacturing overhead costs are fixed and are not affected by the decision.

	<i>Per Unit</i>	<i>Total 10 bracelets</i>
Incremental revenue	<u>\$349.95</u>	<u>\$3,499.50</u>
Incremental costs:		
Variable costs:		
Direct materials	143.00	1,430.00
Direct labor	86.00	860.00
Variable manufacturing overhead	7.00	70.00
Special filigree	<u>6.00</u>	<u>60.00</u>
Total variable cost	<u>\$242.00</u>	2,420.00
Fixed costs:		
Purchase of special tool		<u>465.00</u>
Total incremental cost		<u>2,885.00</u>
Incremental net operating income		<u>\$ 614.50</u>

Even though the price for the special order is below the company's regular price for such an item, the special order would add to the company's net operating income and should be accepted. This conclusion would not necessarily follow if the special order affected the regular selling price of bracelets or if it required the use of a constrained resource.

Exercise 12-5 (20 minutes)

1. The most profitable use of the constrained resource is determined by the contribution margin per unit of the constrained resource. In part 1, the constrained resource is time on the plastic injection molding machine. Therefore, the analysis would proceed as follows:

	<i>Ski Vault</i>	<i>Golf Caddy</i>	<i>Fishing Quiver</i>
Selling price per unit	\$220	\$300	\$175
Variable cost per unit	<u>60</u>	<u>120</u>	<u>55</u>
Contribution margin per unit (a).	<u>\$160</u>	<u>\$180</u>	<u>\$120</u>
Plastic injection molding machine processing time required to produce one unit (b).....	4 minutes	5 minutes	2 minutes
Contribution margin per unit of the constrained resource (a) ÷ (b).....	\$40 per minute	\$36 per minute	\$60 per minute

Production of the Fishing Quiver product would be the most profitable use of the constrained resource which is, in this case, time on the plastic injection molding machine. The contribution margin per minute is \$60 for this product, which is larger than for the other two products.

2. In this part, the constraint is the available pounds of plastic pellets.

	<i>Ski Vault</i>	<i>Golf Caddy</i>	<i>Fishing Quiver</i>
Selling price per unit	\$220	\$300	\$175
Variable cost per unit	<u>60</u>	<u>120</u>	<u>55</u>
Contribution margin per unit (a).	<u>\$160</u>	<u>\$180</u>	<u>\$120</u>
Pounds of plastic pellets required to produce one unit (b).....	5 pounds	6 pounds	5 pounds
Contribution margin per unit of the constrained resource (a) ÷ (b).....	\$32 per pound	\$30 per pound	\$24 per pound

In this case, production of the Ski Vault would be the most profitable use of the constrained resource. The contribution margin per unit of the constrained resource for this product is \$32, which is larger than for the other two products.

Exercise 12-5 (continued)

3. The Golf Caddy product has the largest unit contribution margin, but it is not the most profitable use of the constrained resource in either case above. This happens because the Golf Caddy uses more of the constrained resources in proportion to its contribution margin than the other two products. In other words, more of the other products can be produced for a given amount of the constrained resource and this more than makes up for their lower contribution margins.

Exercise 12-6 (20 minutes)

- The value of relaxing the constraint can be determined by computing the contribution margin per unit of the constrained resource:

	<i>Leather Library Chair</i>
Selling price per unit	\$1,800
Variable cost per unit	<u>1,200</u>
Contribution margin per unit (a)	<u>\$ 600</u>
Upholstery shop time required to produce one unit (b) .	12 hours
Contribution margin per unit of the constrained resource (a) ÷ (b)	\$50 per hour

The company should be willing to pay up to \$50 per hour to keep the upholstery shop open after normal working hours.

- To answer this question, it is desirable to compute the contribution margin per unit of the constrained resource for all three products:

	<i>Gains- borough Armchair</i>	<i>Leather Library Chair</i>	<i>Chippen- dale Fabric Armchair</i>
Selling price per unit	\$1,300	\$1,800	\$1,400
Variable cost per unit	<u>800</u>	<u>1,200</u>	<u>1,000</u>
Contribution margin per unit (a) .	<u>\$ 500</u>	<u>\$ 600</u>	<u>\$ 400</u>
Upholstery shop time required to produce one unit (b)	8 hours	12 hours	5 hours
Contribution margin per unit of the constrained resource (a) ÷ (b)	\$62.50 per hour	\$50.00 per hour	\$80.00 per hour

The offer to upholster chairs for \$45 per hour should be accepted. The time would be used to upholster Chippendale Fabric Armchairs. If this increases the total production and sales of those chairs, the time would be worth \$80 per hour—a net gain of \$35 per hour. If Chippendale Fabric Armchairs are already being produced up to demand, then having these chairs upholstered in the other company would free up capacity to produce more of the other two chairs. In both cases, the additional time is worth more than \$45 per hour.