

MID TERM EXAMINATION

Winter 2009

**PLEASE READ THIS PAGE – IT CONTAINS IMPORTANT INFORMATION BEFORE STARTING TO WRITE BE SURE YOU ARE WRITING IN THE CORRECT EXAM ROOM RELATED TO YOUR SECTION**

1. This examination will last Three (3) hours and consists of **Five (5) Questions printed on (11) pages** including this page. Make sure your copy of the exam is complete before starting.
2. Write all your answers **(including answers to multiple-choice statements)** in the lined examination answer booklet that has been provided to you separately. You may answer the Questions in any order. Indicate clearly your *professor's name* in the front of the booklet.
3. Your answers may be written in pencil or ink.
4. Read the Questions carefully and budget your time carefully. Show details of all work in order to benefit from part marks, except for Multiple-choice questions. Attempt all Questions.
5. This is a closed book examination; no reference to notes, etc. is allowed. However, a silent hand-held four-function calculator and one standard (not electronic) dictionary are permitted.
6. Invigilators will not answer questions, unless you think there is an error in the examination questionnaire.
7. Write all your answers to multiple-choice statements in **IBM Sheet with pencil**.

## QUESTION I. 15 POINTS

MULTIPLE CHOICES: Choose the best answer.

1. Which one of the following tasks would not be performed by a management accountant?
  - (a) Being concerned with the impact of cost and volume on profits
  - (b) Strategic cost management
  - (c) Assisting in budget planning
  - (d) Preparing reports primarily for external users
2. Managerial accounting information
  - (a) pertains to the entity as a whole and is highly aggregated.
  - (b) must be prepared according to generally accepted accounting principles.
  - (c) pertains to subunits of the entity and may be very detailed.
  - (d) is prepared only once a year.
3. Variable costs are costs that
  - (a) vary in total directly and proportionately with changes in the activity level.
  - (b) remain the same per unit at every activity level.
  - (c) Neither of the above
  - (d) Both (a) and (b) above
4. Indirect labour is a
  - (a) non-manufacturing cost.
  - (b) raw materials cost.
  - (c) product cost.
  - (d) period cost.
5. In accumulating raw materials costs, companies debit the cost of raw materials purchased in a perpetual inventory system to
  - (a) Raw Materials Purchases.
  - (b) Raw Materials Inventory.
  - (c) Purchases.
  - (d) Work in Process.
6. Manufacturing overhead is under-applied if
  - (a) actual overhead is less than applied.
  - (b) actual overhead is greater than applied.
  - (c) the predetermined rate equals the actual rate.
  - (d) actual overhead equals applied overhead.

7. Indicate which of the following statements is *not* correct.
- (a) Both a job-order and a process cost system track the same three manufacturing cost elements—direct materials, direct labour, and manufacturing overhead.
  - (b) A job-order cost system uses only one work in process account, whereas a process cost system uses multiple work in process accounts.
  - (c) Manufacturing costs are accumulated the same way in a job-order and in a process cost system.
  - (d) Manufacturing costs are assigned the same way in a job-order and in a process cost system.
8. Hollins Company uses the FIFO method to compute equivalent units. It has 2,000 units in beginning work in process, 20% complete in terms of conversion costs, 25,000 units started and completed during the current period, and 3,000 units in ending work in process, 30% complete in terms of conversion costs. All units are 100% complete in terms of materials. Equivalent units for conversion costs are, respectively,
- (a) 26,600.
  - (b) 27,500.
  - (c) 26,200.
  - (d) 29,600.
9. Which of the following items is *not* characteristic of a process cost system?
- (a) Once production begins, it continues until the finished product emerges.
  - (b) The products produced are heterogeneous in nature.
  - (c) The focus is on continually producing relatively uniform products.
  - (d) When the finished product emerges, all units have precisely the same amount of materials, labour, and overhead.
10. Activity-based costing
- (a) is the initial phase of converting to a just-in-time operating environment.
  - (b) can be used only in a job-order costing system.
  - (c) is a two-stage overhead cost allocation system that identifies activity cost pools and cost drivers.
  - (d) uses direct labour as its primary cost driver.
11. Any activity that causes resources to be consumed is called a
- (a) just-in-time activity.
  - (b) facility-level activity.
  - (c) cost driver.
  - (d) non-value-added activity.
12. An activity that has a direct cause-effect relationship with the resources consumed is a(n)
- (a) cost driver.
  - (b) overhead rate.
  - (c) cost pool.
  - (d) product activity.

13. The degree of operating leverage
- (a) can be calculated by dividing total contribution margin by net income.
  - (b) provides a measure of the company's earnings volatility.
  - (c) affects a company's break-even point.
  - (d) All of the above.
14. Croc Catchers calculates its contribution margin to be less than zero. Which statement is true?
- (a) Its fixed costs are less than the variable cost per unit.
  - (b) Its profits are greater than its total costs.
  - (c) The company should sell more units.
  - (d) Its selling price is less than its variable costs.
15. A high degree of operating leverage
- (a) indicates that a company has a larger percentage of variable costs relative to its fixed costs.
  - (b) is computed by dividing fixed costs by contribution margin.
  - (c) exposes a company to greater earnings volatility risk.
  - (d) exposes a company to less earnings volatility risk.

- 1. D
- 2. C
- 3. D
- 4. C
- 5. B
- 6. B
- 7. D
- 8. B
- 9. B
- 10. C
- 11. C
- 12. A
- 13. D
- 14. D
- 15. C

## QUESTION II. 20 POINTS

Montreal Inc. uses normal job-order costing to assign costs to products. The company assembles and packages 20 different products according to customer specifications. On October 1, the company had the following balances:

Raw materials	\$ 7,800
Work in process	45,726
Finished goods	23,520

Work in process consisted of the following jobs:

	<u>Job 22</u>	<u>Job 24</u>	<u>Job 25</u>
Direct materials	\$4,200	\$3,190	\$2,800
Direct labour	8,500	7,210	6,500
Applied overhead	5,100	4,326	3,900
Total	<u>\$17,800</u>	<u>\$14,726</u>	<u>\$13,200</u>
Number of units	30	50	35

Finished goods consisted of Job 23, with the following costs:

Direct materials	\$7,200
Direct labour	10,200
Applied overhead	<u>6,120</u>
Total	<u>\$23,520</u>
Number of units	50

Shown below are the direct cost data related to jobs started in October:

	<u>Job 26</u>	<u>Job 27</u>	<u>Job 28</u>	<u>Total</u>
Direct materials	\$4,180	\$3,600	\$1,200	\$ 8,980
Direct labour	9,200	8,340	2,910	20,450
Number of units	40	50	40	

Other information:

1. Direct materials and direct labour added to beginning work in process in October were as follows:

	<u>Job 22</u>	<u>Job 24</u>	<u>Job 25</u>	<u>Total</u>
Direct materials	\$ 950	\$ 410	\$1,200	\$ 2,560
Direct labour	2,000	3,500	4,500	10,000

2. Overhead is applied at a predetermined rate based on the direct labour cost.
3. Actual factory overhead expenses for October were as follows:
 

Supervisory salaries	\$4,000
Factory rent	2,000
Amortization (machines)	3,000
Indirect labour	8,200
Supplies (factory)	1,100
Selling expenses	8,500
Property tax and insurance	1,250
4. Purchases of direct materials (raw materials) during October amounted to \$8,500. Indirect materials (supplies) are handled in a separate account.
5. Only Job Nos. 27 and 28 are still in process at closing on October 31. Finished goods consisted only of Job No. 25 at month end.
6. Avid writes off any over- and under-applied overhead to Cost of Goods Sold in the month in which it is incurred.

### *Instructions*

- (a) What is the predetermined overhead rate used by Avid to apply overhead to jobs?
- (b) What is the unit cost of Job No. 24 in October?
- (c) What are the October 31 balances for the following inventory accounts?
  1. Raw Materials
  2. Work in Process
  3. Finished Goods
- (d) What is the cost of goods manufactured in October? (You do not have to prepare a **formal** statement.)
- (e) Determine the over- or under-applied overhead for October and prepare the journal entry to dispose of this amount, assuming that over- and under- applied overhead is not prorated.

## Solution-2 20 Points

- (a) Using Job 22 as the basis for the calculation,

Overhead rate =  $\$5,100 \div \$8,500 = 60\%$  of the labour cost. **2 Points**

- (b) Unit cost of Job 24: **3 POINTS**

	Direct Materials	Direct Labour	*Applied Overhead	TOTAL
Beginning WIP	\$ 3,190	\$ 7,210	\$ 4,326	\$14,726
Costs added in Oct.	410	3,500	2,100	6,010
Total	\$ 3,600	\$ 10,710	\$ 6,426	20,736
Divide by the number of units	.5PT	.5PT	1PT	÷ 50
Unit cost of Job 24				<u>\$414.72</u> 1PT

\*  $\$3,500 \times 60\% = \$2,100$

- (c) (i) Raw Materials Inventory **1.5 PTS**

Beginning balance	\$ 7,800
Plus Purchases	<u>8,500</u>
Material available for use	.5PT 16,300
Less: Material used	1 PT <u>11,540</u> *
Ending balance	<u>\$ 4,760</u>

* Direct materials, Jobs 26, 27, 28	\$ 8,980
Direct materials, Jobs 22, 24, 25	<u>2,560</u>
	<u>\$ 11,540</u>

- (ii) Work in Process Inventory **3 PTS**

	Job 27	Job 28	TOTAL
Direct materials (given)	\$ 3,600	\$1,200	\$ 4,800
Direct labour (given)	8,340	2,910	11,250
Overhead (60% of direct labour)	<u>5,004</u>	<u>1,746</u>	<u>6,750</u>
	<u>\$16,944</u>	<u>\$5,856</u>	<u>\$22,800</u>
	1 PT	1 PT	1 PT

(iii) Finished Goods Inventory **1.5 PTS**

	Job 25
From beginning WIP	\$ .25PT 13,200
Plus: costs added in October	
Direct materials (given)	.25PT 1,200
Direct labour (given)	.25PT 4,500
Overhead (60% of direct labour)	.75 PT 2,700
	<u>\$ 21,600</u>

(d) Cost of Goods Manufactured **5 POINTS**

	Direct Materials	Direct Labour	Applied Overhead	TOTAL
Job 22	\$ 5,150	\$10,500	\$ 6,300	\$ 21,950 1.25PT
Job 24	3,600	10,710	6,426	20,736 1.25PT
Job 25	4,000	11,000	6,600	21,600 1.25PT
Job 26	4,180	9,200	5,520	18,900 1.25PT
				<u>\$ 83,186</u>

Or

- beginning w.i.p. (17800+14726+13200) = \$ 45,726
- mfg costs
  - Direct material used \$ 11,540
  - Direct labour + 30,450
  - Applied overhead + 18,270 = 60,260
- Total WIP \$105,986
- less ending w.i.p. from part c)ii) (22,800)
- cost of goods mfg 83,186

(e) Under- or Over-applied Overhead **4 POINTS**

Supervisory salaries	\$ 4,000
Factory rent	2,000
Amortization (machines)	3,000
Indirect labour	8,200
Factory supplies	1,100
Property tax and insurance	1,250

Total overhead incurred **1.5PTS**

19,550



Less: Overhead applied ( $\$30,450 \times 60\%$ )	1.5PTS	18,270	
Under-applied overhead		<u>\$ 1,280</u>	
Cost of Goods Sold		\$ 1,280	
Manufacturing Overhead	1PT		1,280

### QUESTION III. 20 POINTS

S&R Inc manufactures the nutrient fit-for-life through two manufacturing processes: blending and packaging. All materials are entered at the beginning of each process. On August 1, 2008, inventories consisted of Raw Materials \$5,000; Work in Process—Blending \$0; Work in Process—Packaging total \$8,000 which is \$5,000 for transferred in cost from blending Department, \$1,000 for material costs and \$2,000 for conversion costs; and Finished Goods \$7,500. The beginning inventory Work in Process—Packaging consisted of 500 units, 40% complete as to conversion costs. During August, 9,000 units were started into production in blending, and 8,200 units transferred from blending to packaging at a cost of \$82,000. The units transferred from packaging to finished goods were 8,600 units. The ending inventory Work in Process-Packaging was 50% completed as to conversion costs.

In addition the following transactions were completed:

1. Purchased \$75,000 of raw materials.
2. Issued direct raw materials for production: \$16,800 for blending and \$16,400 for packaging.
3. Incurred factory labour costs of \$22,770.
4. Used direct labour: \$12,230 for blending and \$8,950 for packaging.
5. Incurred \$41,300 of manufacturing overhead, including factory amortization of \$10,000 and the rest paid in cash and on account.
6. Applied manufacturing overhead at the rate of \$50 per machine hour. Machine hours were 900 hours for blending and 300 hours for packaging.

#### *Instructions*

Answer the following questions for Packaging Process that is using Weighted –Average method.

1. Prepare a schedule of equivalent units for the August activity
2. Determine the unit cost of items transferred to finished goods.
3. Determine the total costs of all units transferred to finished goods
4. Determine the total costs assigned to ending inventory

## Solution 20 POINTS

Quantities	Physical Units	Equivalent Units		Transfer Costs
		Materials Costs	Conversion Costs	
Units to be accounted for				
Work in process, April 1	500			
Transferred from Blending	<u>8,200</u>			
Total units	<u>8,700</u>			
Units accounted for				
Transferred to finished goods	8,600	8,600	8,600	8,600
Work in process, August 31, 50% CC	<u>100</u>	<u>100</u>	<u>50</u>	<u>100</u>
Total units	<u>8,700</u>	<u>8,700</u>	<u>8,650</u>	<u>8,700</u>
	2PTS	2PTS	2PTS	2PTS

Costs	Transfer red	Materials	Conversion Costs	Total
Unit costs				
BI	\$5,000	\$1,000	\$2,000	
Costs in August (a)	<u>\$82,000</u>	<u>\$16,400</u>	<u>\$23,950</u>	
Equivalent units (b)	<u>\$87,000</u>	<u>\$17,400</u>	<u>\$25,950</u>	<u>\$130,350</u>
Unit costs (a) ÷ (b)	<u>8,700</u>	<u>8,700</u>	<u>8,650</u>	
	<u>\$10.00</u>	<u>\$2.00</u>	<u>\$3.00</u>	<u>\$15.00</u>
	2PTS	2PTS	2PTS	

### Cost Reconciliation Schedule

Costs accounted for		
Transferred out (8,600 X \$15.00)	3PTS	\$ 129,000
Work in process ENDING 3 PTS		
Transferred in (100 X \$10.00)		\$1,000
Materials (1,00 X \$2.00)		\$ 200
Conversion costs (50 X \$3.00)		<u>150</u>
Total costs		<u>\$ 1,350</u>
		<u>\$130,350</u>

1. Prepare a schedule of equivalent units for the August activity see above **8 POINTS**
2. Determine the unit cost of items transferred to finished goods. \$15 **6 POINTS**
3. Determine the total costs of all units transferred to finished goods \$129,000 **3 POINTS**
4. Determine the total costs assigned to ending inventory \$1,350 **3 POINTS**

### QUESTION IV. 20 POINTS

H&L is a public accounting firm that offers two primary services: auditing and tax return preparation. A controversy has developed between the partners of the two service lines as to who is contributing the greater amount to the bottom line. The area of disagreement is the assignment of overhead. The tax partners want overhead assigned on the basis of 40% of direct labour dollars, while the audit partners want to implement activity-based costing. The partners agree to use next year's budgeted data for purposes of analysis and comparison. The following overhead data are collected to develop the comparison:

Activity Cost Pools	Cost Drivers	Estimated Overhead	Expected Use of Cost Drivers	Expected Use of Cost Drivers per Service	
				Audit	Tax
Employee training	Direct labour dollars	\$216,000	\$1,800,000	\$1,000,000	\$800,000
Typing and secretarial	Number of reports/forms	76,200	2,500	600	1,900
Computing	Number of minutes	204,000	60,000	25,000	35,000
Facility rental	Number of employees	142,500	40	22	18
Travel	Per expense reports	<u>127,000</u>	Direct	86,000	41,000
		<b>\$765,700</b>			

#### *Instructions*

- (a) Using traditional product costing, as proposed by the tax partners, calculates the total overhead cost assigned to both services (audit and tax) of H&L
- (b)
  1. Using activity-based costing, prepare a schedule that shows the calculations of the activity-based overhead rates (per cost driver).
  2. Prepare a schedule that assigns each activity's overhead cost pool to each service based on the use of the cost drivers.

- (c) Classify each of the activities as a value-added activity or a non–value-added activity.
- (d) Comment on the comparative overhead cost for the two services under both traditional costing and ABC.

## Solution 20 POINTS

- (a) Computation of assigned overhead under traditional costing ("direct labour dollars" appears in the first line of the schedule of overhead data): Predetermined overhead rate X direct labour dollars

Overhead assigned to audit: .40 X \$1,000,000 = \$400,000 **1.5 POINTS**

Overhead assigned to tax: .40 X \$800,000 = \$320,000 **1.5 POINTS**

- (b) (1) Computation of activity-based overhead rate: **1.5 PTS each x 5 = 7.5 POINTS**

Activity Cost Pools	Estimated Overhead	÷	Expected Use of Cost Drivers per Activity	=	Activity-Based Overhead Rates
Employee training	\$216,000		\$1,800,000 DL dollars		\$ 0.12 per DL dollar
Typing and secretarial	76,200		2,500 Reports/forms		\$30.48 per report
Computing	204,000		60,000 Minutes		\$ 3.40 per minute
Facility rental	142,500		40 Employees		\$3,562.50 per emplo
Travel	127,000		Direct		Direct
	<u>\$765,000</u>				

- (2) Assignment of overhead to audit and tax services: **1 PT each x 5 = 5 POINTS**

Activity Cost Pools	Audit			Tax		
	Expected Use of Cost Driver	Activity-Based Overhead Rate	Cost Assigned	Expected Use of Cost Driver	Activity-Based Overhead Rate	Cost Assigned
Employee training	\$1,000,000	\$.12	\$120,000	\$800,000	\$.12	\$ 96,000
Typing and secretarial	600	\$30.48	18,288	1,900	\$30.48	57,912
Computing	25,000	\$3.40	85,000	35,000	\$3.40	119,000
Facility rental	22	\$3,562.50	78,375	18	\$3,562.50	64,125
Travel	86,000	Direct	<u>86,000</u>	41,000	Direct	<u>41,000</u>
Overhead costs assigned			<u>\$387,663</u>			<u>\$378,037</u>

- (c)
- | Activity               | Value-Added vs. Non-value-Added |
|------------------------|---------------------------------|
| Employee training      | Non-value-added                 |
| Typing and secretarial | Value-added                     |
| Computing              | Value-added                     |
| Facility rental        | Non-value-added                 |
| Travel                 | Non-value-added                 |

**.5 PT each x 5 = 2.5 POINTS**

- (d) Overhead is assigned to the two service lines as follows: **2 POINTS**

	<u>Audit</u>	<u>Tax</u>
Traditional costing	\$400,000	\$320,000
ABC	<u>387,663</u>	<u>378,037</u>
Difference	<u>\$ 12,337</u>	<u>\$ 58,037</u>

The \$12,337 difference for audits is 3.1% lower under ABC costing, while the \$58,037 difference for tax is 18.1% higher under ABC costing. Clearly, ABC costing should be used to determine the relative profitability of each service.

## QUESTION V. 25 POINTS

### Part-1 10 MARKS

Vice President for Sales and Marketing Sam Totter is trying to plan for the coming year in terms of production needs to meet the sales demand. He is also trying to determine ways in which the company's profits might be increased in the coming year. Waterways Inc. markets a simple water control and timer that it mass-produces. During 2008, the company sold 696,000 units at an average selling price of \$4.22 per unit. The variable expenses were \$2,053,200, and the fixed expenses were \$683,338.

#### Instructions

- (1) What is the product's contribution margin ratio?
- (2) What is the company's break-even point in units and in dollars for this product?
- (3) What is the margin of safety, both in dollars and as a ratio?
- (4) If management wanted to increase its income from this product by 10%, how many additional units would have to be sold to reach this income level?
- (5) If sales increase by 71,090 units and the cost behaviours do not change, how much will income increase on this product?

### Part-2 7.5 MARKS

Waterways Inc. has a sales mix of sprinklers, valves, and controllers as follows.

#### Annual expected sales:

Sale of sprinklers 450,000 units at \$26.50  
Sale of valves 1,500,000 units at \$11.20  
Sale of controllers 50,000 units at \$42.50

#### Variable manufacturing cost per unit:

Sprinklers \$13.96  
Valves \$7.95  
Controllers \$29.75

#### Fixed manufacturing overhead cost (total) \$760,000

#### Variable selling and administrative expenses per unit:

Sprinklers \$1.30  
Valves \$0.50  
Controllers \$3.41



**Fixed selling and administrative expenses (total) \$1,600,000**

**Instructions**

- (1) Assuming the sales mix remains the same, Calculate the number of units of each product that Waterways Inc. must sell in order to break even under this product mix.

**Part-3 7.5 MARKS**

The section of Waterways that produces controllers for the company provided the following information.

Sales for month of February:	4,000
Variable manufacturing cost per unit:	\$ 9.75
Sales price per unit:	\$42.50
Fixed manufacturing overhead cost (per month for controllers):	\$81,000
Variable selling and administrative expenses per unit:	\$3.41
Fixed selling and administrative expenses (per month for controllers):	\$13,122

**Instructions**

- (1) Using this information for the controllers, determine the degree of operating leverage.
- (2) What does this information suggest if Waterways' cost structure is the same for the company as a whole?
- (3) Assuming that sales revenue from the controllers increases by 25%, use the degree of operating leverage calculated in (1) above to calculate the increase in net income.

**PART-1 15 MARKS 2 POINTS EACH QUESTION X 5 = 10 PTS**

(1) The contribution margin ratio is 30% ( $\$883,920 \div \$2,937,120$ ):

Waterways Corporation  
Contribution Margin Income Statement for Water Control  
and Timer  
For the Year 2008

		Unit Cost	
Sales (696,000 units)	\$2,937,120	\$4.22	100%
Variable expenses	<u>2,053,200</u>	<u>2.95</u>	70%
Contribution margin	883,920	1.27	30%
Fixed Expenses	<u>683,338</u>		
Net income from product	<u>\$ 200,582</u>		

(2) Break-even point in units = 538,061 units

$$\frac{\text{Fixed expenses}}{\text{Unit CM}} = \frac{\$683,338}{\$1.27} = 538,061 \text{ units (rounded)}$$

Break-even point in sales dollars = \$2,277,793

$$\frac{\text{Fixed expenses}}{\text{CM ratio}} = \frac{\$683,338}{.30} = \$2,277,793 \text{ (rounded)}$$

(3) Margin of safety in dollars = \$659,327

$$\begin{array}{r} \text{Sales} \\ \text{Less: Break-even in dollars} \end{array} \quad \begin{array}{r} \$2,937,120 \\ \underline{2,277,793} \\ \$ 659,327 \end{array}$$

Margin of safety ratio = 22.45%

$$\frac{\text{Margin of safety in dollars}}{\text{Sales}} = \frac{\$659,327}{\$2,937,120} = 22.45\%$$

(4) 10% increase in income = \$ 20,058.20 / \$1.27 = 15,794 additional units

(5) INCREASE IN UNITS 71,090 X CM PER UNIT \$1.27 = \$90,284.30

**Part 2 7.5 POINTS**

(1) Total units = 450,000 + 1,500,000 + 50,000 = 2,000,000

Sales mix    Sprinklers =  $\frac{450,000}{2,000,000} = 22.5\%$

Valves =  $\frac{1,500,000}{2,000,000} = 75\%$  **.75 PT (.25 EACH)**

Controllers =  $\frac{50,000}{2,000,000} = 2.5\%$

	<b>Sprinklers</b>	<b>Valves</b>	<b>Controllers</b>
Sales price	\$ 26.50	\$ 11.20	\$ 42.50
Variable costs			
Manufacturing	13.96	7.95	29.75
Selling & admin.	<u>1.30</u>	<u>0.50</u>	<u>3.41</u>
	<u>15.26</u>	<u>8.45</u>	<u>33.16</u>
Contribution margin	<u>\$ 11.24</u>	<u>\$ 2.75</u>	<u>\$ 9.34</u>
	<b>.75 PT</b>	<b>.75 PT</b>	<b>.75 PT</b>

**Weighted-Average Unit Contribution Margin**

	Unit CM × Sales Mix % =	Weighted-Avg Unit CM
Sprinklers	\$ 11.24    22.5%	\$ 2.53
Valves	2.75    75.0%	2.06
Controllers	9.34    2.5%	<u>0.23</u>
	<b>1 PT</b>	<u><u>\$ 4.82</u></u>

**Break-even Point in Units 2 PTS**

<u>Fixed Costs</u>	<u>\$2,360,000*</u>	
Weighted Average Unit CM	\$4.82	489,627    units

**\*(\$760,000 + \$1,600,000)**

22.5% X 489,627 = 110,166 units Sprinklers **.5PT**

75.0 %X 489,627 = 367,220 units Valves **.5PT**

2.5% X 489,627 = 12, 241 units Controllers **.5PT**

**Part 3 7.5 POINTS**

**(1) 4 POINTS**

	February	
Sales (4,000 x \$42.50)	\$ 170,000	.5PT
Variable costs (4,000 x \$13.16*)	<u>52,640*</u>	1 PT
Contribution margin	117,360	
Fixed costs (\$81,000 + \$13,122 )	<u>94,122</u>	1 PT
Net income	<u>\$ 23,238</u>	
*(9.75 + 3.41)		

**Degree of Operating Leverage**

$$\text{Contribution Margin} / \text{Net Income} = \text{Degree of Operating Leverage}$$
$$\$117,360 / \$23,238 = 5.05 \text{ 1.5 PTS}$$

- (2) Waterways has high fixed costs relative to its variable costs. This results in a high degree of operating leverage. As a consequence, if the market is good and the company's sales increase, its net income will increase very rapidly. Its degree of operating leverage of 5.05 means that a 10% increase in sales will result in a 50.5% (10% × 5.05) increase in net income. However, it also means that if sales decline, its net income will decline very rapidly. A 10% decrease in sales will result in a 50.5% decrease in net income. **1.5 POINTS**

**(3) 2 POINTS**

**Percentage Increase in Net Income**

$$\text{Increase in Sales } .25 \times \text{DOL } 5.05 = 1.2625$$

$$\text{Increase in net income } 1.2625 \times \$\$ 23,238 = \$29,338$$