BUSI 1005 – Additional Problems
Final Exam Review

Cost Classification Example –

Baker Company, a manufacturer, had these beginning and ending inventories at the end of its current year:

	Beginning	*End*
Raw materials	$22,000	$30,000
WIP	40,000	48,000
Finished goods	5,000	18,000

During the year, the following transactions occurred:

1. Direct materials purchased $300,000
2. Indirect materials and supplies purchased 50,000
3. Direct labour wages 120,000
4. Indirect factory labour wages 60,000
5. Property taxes on factory building 15,000
6. Depreciation on factory building 5,000
7. Utilities (60% to factory, 40% to selling and administration expense) 50,000
8. Indirect materials issued to factory 40,000
9. Payroll taxes and fringe benefits on labour wages 46,800
10. Factory overhead applied on the basis of 120% of total direct labor costs ?
11. Sales on account 730,000
12. Over- or underapplied overhead is deducted from or added to cost of goods sold.

Required:

a. Prepare a cost of goods manufactured statement.
b. Prepare a cost of goods sold statement.

SOLUTION

a. *Baker Company*
Schedule of Cost of Goods Manufactured
For the year ended…

Direct materials used		
Raw materials inventory, beginning	$22,000	
Direct materials purchased	300,000	
Indirect materials and supplies purchased	50,000	
Less: Indirect materials used	(40,000)	
Raw Materials inventory, ending	(30,000)	$302,000
Direct labour ($120,000 + 46,800 x 2/3)		151,200
Manufacturing overhead applied: $151,200 x 120%		181,440
Total manufacturing costs		634,640
WIP – beginning		40,000
WIP – ending		(48,000)
Cost of goods manufactured		$626,640

b.

Cost of goods sold	
Finished goods inventory, beginning	$25,000
Cost of goods manufactured	626,640
Finished goods inventory, ending	(18,000)
	633,640
Overapplied overhead (Schedule)	(15,840)
	$617,800

Overapplied overhead -

Actual overhead:	
Indirect factory labour	$60,000
Property taxes on factory building	15,000
Depreciation on factory building	5,000
Utilities: $50,000 x 60%	30,000
Indirect materials used	40,000
Fringe benefits: $46,800 x 1/3 ($60,000 / 180,0000)	15,600
	165,600
Overhead applied	181,440
Overapplied overhead	$ 15,840

Overhead Application Example 1 -

Woodman Company applies factory overhead on the basis of direct labor hours. Budget and actual data for direct labor and overhead for the year are as follows:

	Budget	*Actual*
Direct labor hours	600,000	550,000
Factory overhead costs	$720,000	$680,000

Calculate the amount of applied overhead costs for the year. Is the amount over or underapplied?

POR = $720,000 / 600,000 = $1.20 per DLH
Overhead applied = 550,000 hours x $1.20 = $660,000
Under-applied overhead = $680,000 $^{\text{Actual OH}}$ = $660,000 $^{\text{Applied OH}}$ = $20,000

Overhead Application Example 2

Worley Company has underapplied overhead of $45,000 for the year. Before disposition of the underapplied overhead, selected year-end balances from Worley's accounting records were:

Sales	$1,200,000
Cost of goods sold	720,000
Direct materials inventory	36,000
Work-in-process inventory	54,000
Finished goods inventory	90,000

Under Worley's cost accounting systsm, over- or underapplied overhead is prorated to appropriate inventories and COGS based on year-end balances.

What amount of cost of goods sold should Worley report in its year-end income statement?

	Balance	*%*	*Proration*
WIP	$ 54,000	6.25	$2,813
Finished goods	90,000	10.42	4,689
COGS	720,000	83.33	37,498
	$864,000		$45,000

COGS = $720,000 + $37,498 = $757,498

Job Order Costing Example –

Aislin Corporation uses a job-order costing system. The table below provides selected data on the three jobs worked on during the company's first month of operations:

	Job Number		
	1010	**1020**	**1030**
Units of product in the job	4,000	3,600	3,000
Machine-hours worked	1,200	1,000	900
Direct materials cost	$4,500	$3,700	$1,400
Direct labour cost	9,600	8,000	7,200

Actual overhead costs totalling $30,000 were incurred during the month. Manufacturing overhead cost is applied to production on a basis of machine-hours at a predetermined rate of $9 per hour. Jobs 1010 and 1020 were completed during the month; job 1030 was not completed.

Required:

1. Compute the unit cost of jobs 1010 and 1020.
2. Prepare a journal entry showing the transfer of the completed jobs into the finished goods warehouse. (2 marks)
3. What is the balance in the Work in Process account at the end of the month?
4. What is the balance in the Manufacturing Overhead account at the end of the month?

1.

	Job 1010	*Job 1020*	*Job 1030*
Machine-hours	1,200	1,000	900
Predetermined overhead rate	× $9	× $9	× $9
Manufacturing overhead applied	$10,800	$9,000	$8,100

	Job 1010	*Job 1020*
Direct materials	$ 4,500	$ 3,700
Direct labour	9,600	8,000
Manufacturing overhead applied	10,800	9,000
Total cost (a)	$24,900	$20,700
Number of units (b)	4,000	3,600
Cost per unit (a) ÷ (b)	$6.225	$5.75

2.

Finished Goods*	45,600	
Work in Process		45,600

*$24,900 + $20,700 = $45,600.

3. The balance in the Work in Process account will consist entirely of the costs associated with job 1030:

Direct materials	$ 1,400
Direct labour	7,200
Manufacturing overhead applied	8,100
Total cost in work in process	$16,700

4. The balance in the Manufacturing Overhead account can be determined as follows:

Manufacturing Overhead

Actual overhead	30,000	27,900	Applied overhead
Under- applied	2,100		

Activity Based Costing Example

The controller for Mitchell Supply Company has established the following overhead cost pools and cost drivers:

Overhead Cost Pool	Budgeted Overhead Cost	Cost Driver
Machine setups	$150,000	Number of setups
Material handling	52,500	Units of raw material
Quality control inspection	37,500	Number of inspections
Other overhead costs	90,000	Machine hours
Total	$330,000	

Overhead Cost Pool	Budgeted Level for Cost Driver	Overhead Rate
Machine setups	100 setups	$1,500 per setup
Material handling	50,000 units	$1.05 per unit
Quality control	1,000 inspections	$37.50 per inspection
Other overhead	15,000 machine hours	$6 per machine hour

Order no. 610 has the following production requirements:

Machine setups	5 setups
Raw material	10,000 units
Inspections	12 inspections
Machine hours	600 machine hours

Required:

1. Compute the total overhead that should be assigned to order no. 610 by using activity-based costing.
2. Suppose that Mitchell were to use a single, predetermined overhead rate based on machine hours. Compute the rate per hour and the total overhead assigned to order no. 610.

1. Machine setups: 5 setups x $1,500 $7,500
   Materials handling: 10,000 units x $1.05 10,500
   Quality control: 12 inspections x $37.50 450
   Other: 600 machine hours x $6.00 3,600
   $22,050

2. Total machine hours = $90,000 / 6 = 15,000
   Predetermined overhead rate = 330,000 / 15,000 = $22 per MH

   Overhead allocated to Order no. 610: 600 MH x $22 $13,200

CVP Analysis Example

Teri Hall has recently opened Sheer Elegance, Inc., a store specializing in fashionable stockings. Ms. Hall has just completed a course in managerial accounting, and she believes that she can apply certain aspects of the course to her business. She is particularly interested in adopting the cost-volume-profit (CVP) approach to decision making. Thus, she has prepared the following analysis:

Sales price per pair of stockings	$2.00
Variable expense per pair of stockings	0.80
Contribution margin per pair of stockings	$1.20
Fixed expenses per year:	
Building rental	$12,000
Equipment depreciation	3,000
Selling	30,000
Administrative	15,000
	$60,000

1. How many pairs of stockings must be sold to break even?
2. How many pairs of stockings must be sold to earn a $9,000 target net income for the first year? Assume a tax rate of 40%.
3. Ms. Hall believes that a 10% reduction in the selling price combined with a $5,000 increase in advertising expense will increase sales by 50%. What is the impact on operating income if this happens? Assume the current sales level is 70,000 pair of stockings. Use the incremental approach.
4. Refer to the original data. Actual sales for the first year were $125,000.
   a. What is the store's degree of operating leverage?
   b. Ms. Hall is confident that with some effort she can increase sales by 20% next year. What would be the expected percentage increase in net income? Use the operating leverage concept to compute your answer.

1. $60,000 / 1.20 = 50,000 units

2. Operating income = $9,000 / .6 = $15,000
($15,000 + 60,000) / 1.20 = 62,500

3. Net selling price = $2.00 x .9 = $1.80; New CM/unit = $1.80 – 0.80 = $1.00

Change in contribution margin -	
Before: 70,000 x $1.20	84,000
After: 70,000 x 1.50 x $1.00	105,000
Increase in CM	21,000
Increase in advertising	(5,000)
	$16,000

4a. Total CM = $125,000 x 0.60 = $75,000
Operating income = $75,000 - 60,000 = $15,000
DOL = $75,000 / 15,000 = 5

4b. 5 x 20% = 100%

Direct/Absorption Costing Example

The following data relate to Flores Company for the year ended December 31, 19x8:

Cost of production:	
Direct materials	$168,000
Direct labor	252,000
Factory overhead:	
Variable	90,000
Fixed	180,000
Sales commission (variable)	44,000
Sales salaries (fixed)	46,000
General and administrative expenses (fixed)	62,000
Units produced	75,000
Units sold (@$18)	60,000

(a) Compute the amount of income before income taxes and ending inventory under (1) absorption costing and (2) direct costing.
(b) Reconcile the difference in operating income between the two methods.

a. Absorption Costing

Sales (60,000 x $18)		$1,080,000
Cost of goods sold		
Cost of goods mfg (168,000 + 252,000 + 90,000 + 180,000)		690,000
Less ending inventory: 690,000 ÷ 75,000 x 15,000		-138,000
		828,000
Gross margin		528,000
Selling and administrative expenses (44,000 + 46,000 + 62,000)		152,000
Operating Income		$376,000

Variable Costing

Sales (60,000 x $18)		$1,080,000
Variable costs		
Manufacturing (168,000 + 252,000 + 90,000)	510,000	
Less ending inventory: 510,000 ÷ 75,000 x 15,000	102,000	
	408,000	
Sales commissions	44,000	452,000
Contribution margin		628,000
Fixed costs (180,000 + 46,000 + 62,000)		288,000
Operating Income		$340,000

b.

Units in ending inventory	15,000
Fixed overhead per unit = $180,000 ÷ 75,000	$2.40
Fixed overhead in ending inventory (absorption costing) = Difference in income with variable costing	$36,000

Special Order Example – Baxter Company manufactures soccer balls. The estimated income statement for the year before any special order is as follows:

	Amount	*Per Unit*
Sales	$8,000,000	$20.00
Cost of goods sold	6,800,000	17.00
Gross margin	1,200,000	3.00
Administrative and selling	320,000	0.80
Operating income	$ 880,000	$2.20

Fixed costs included in the estimated income statement are $2,400,000 in cost of goods sold and $120,000 in administrative and selling expenses. Baxter received a special order of 160,000 soccer balls at $15 each. Variable administrative and selling and selling expenses on the special order will be 40% of the current amount. Baxter's current capacity is 500,000 soccer balls per year. If the special order is taken, Baxter must purchase an imprinting machine costing $20,000. This machine will be discarded once the special order is complete.

What is the incremental income of taking the special order?

Number of balls produced and sold = $8,000,000 / 20 = 400,000	
Variable costs – manufacturing: ($6,800,000 – 2,400,000) / 400,000	$11.00
Variable costs – admin and selling: ($320,000 – 120,000) / 400,000	0.50
CM per unit – regular sales: $20 - 11.00 – 0.50 = $8.50	
CM per unit – special order: $15 – 11 – 0.20 = $3.80	
CM on special order: 160,000 x $3.80	$608,000
CM lost on regular sales: 60,000 x $8.50	(510,000)
Cost of imprinting machine	(20,000)
Incremental income of special order	$ 78,000

Make or Buy Example – The Marvel Company currently produces 10,000 of a part that is used in the manufacture of another of its products. Marvel can buy the part from an outside supplier at a cost of $56. The cost to manufacture the part is as follows:

Direct materials	$25
Direct labour	6
Variable overhead	14
Fixed overhead	15
	$60

The fixed overhead included the salary of the product line supervisor of $45,000. If the part is purchased externally, the supervisor will be transferred elsewhere in the company and will continue to receive the same salary. If this happens, the company will be able to avoid hiring a new supervisor at a cost of $40,000.

If the product is outsourced, Marvel can use the freed up space to manufacture a new product that will generate annual contribution margin of $50,000.

Should Marvel continue making the part?

Cost to buy: 10,000 x $56		$560,000
Cost to make		
Variable costs: 10,000 x ($25 + 6 + 14)	$450,000	
Avoidable salary cost	40,000	
CM on new product line	50,000	$540,000

Marvel should continue to make the part since the cost to make is $20,000 less than the cost to purchase the part externally.

Add/Drop Example: Condensed monthly operating income data for Cosmo, Inc., for November 20x4 is presented below.

	Total	*Mall Store*	*Town Store*
Sales	$200,000	$80,000	$120,000
Variable costs	116,000	32,000	84,000
Contribution margin	84,000	48,000	36,000
Direct fixed costs	60,000	20,000	40,000
Store segment margins	24,000	28,000	4,000
Common fixed costs	10,000	4,000	6,000
Operating income	$ 14,000	$24,000	$(10,000)

- One-fourth of each store's direct fixed costs would continue through December 31, 20x5, if either store were closed.
- Cosmo allocates common fixed costs to each store on the basis of sales dollars.
- Management estimates that closing the Town Store would result in a 10% decrease in Mall Store sales, while closing the Mall Store would not affect Town Store sales.
- The operating results for November 20x4 are representative of all months.

Required:

a. If Cosmo closed the Town Store, what would be the monthly increase (decrease) in Cosmo's operating income during 20x5?

b. Cosmo is considering a promotional campaign at the Town Store that would not affect the Mall Store. Increasing annual promotional costs at the Town Store by $60,000 would increase Town Store's sales by 10%. What would be the monthly increase (decrease) in Cosmo's operating income during 20x5 if this campaign is undertaken?

c. One-half of Town Store's dollar sales are from items sold at variable cost to attract customers to the store. Cosmo is considering dropping these items, a move that would reduce the Town Store's direct fixed costs by 15% and result in a loss of 20% of the remaining Town Store's sales volume. This change would not affect the Mall Store. If Cosmo dropped the items sold at variable cost, what would be the monthly increase (decrease) in Cosmo's operating income during 20x5?

a.	Lost CM from Town store:	$(36,000)
	Avoidable direct fixed costs: $40,000 x ¾	30,000
	Lost CM – Mall Store: $48,000 x 10%	(4,800)
	Incremental operating income of closing the Town Store	$(10,800)
b.	Increase in CM: $36,000 x 10%	$3,600
	Monthly advertising cost: $60,000 / 12	(5,000)
	Incremental impact on operating income	$(1,400)
c.	Lost CM: $36,000 x 20%	$(7,200)
	Reduction in direct fixed costs: $40,000 x 15%	6,000
	Incremental impact on operating income	$(1,200)

Scarce Resource Example – The Sanatos Company makes and sells three products:

	A	B	C
Demand in units	110	100	90
Selling price per unit	$90	$110	$95
Variable cost per unit	40	50	50
Minutes per unit on C2 machine	10	15	5

The total number of minutes available on the C2 machine is 2,450 per day.

Calculate the optimum product mix.

	A	B	C
CM per unit	$50	$60	$45
Minutes per unit on C2 machine	10	15	5
CM per minute	$5	$4	$9
			Total Minutes Available
			2,450
Product C: 90 units x 5 minutes			450
			2,000
Product A: 110 units x 10 minutes			1,100
			900
Product B: 60 units x 15 minutes			900
			-0-

Sell or Process Further xample - Yardley Corporation uses a joint process to produce products A, B, and C. Each product may be sold at its split-off point or processed further. Additional processing costs are entirely variable and are traceable to the respective products. Additional information follows:

			If Processed Further	
Product	*Units Produced*	*Sales Value At Split-Off*	*Sales Value*	*Additional Costs*
A	20,000	$ 45,000	$60,000	$20,000
B	15,000	75,000	98,000	20,000
C	15,000	30,000	62,000	18,000

To maximize profits, which products should Yardley process further?

Product	*Inrcremental Revenues If Processed Further*	*Incremental Costs of Processing Further*	*Incremental Income of Processing Further*
A	$15,000	$20,000	$(5,000)
B	23,000	20,000	3,000
C	32,000	18,000	14,000

Products B and C should be processed further only.

Flexible Budget Example – assume that a company budgets to sell 4,000 units a year of a product with a budgeted selling price of $30 and a budgeted variable costs of $20. Budgeted fixed costs are $30,000. Actual results are actual sales of 4,500 units, selling price of $29, variable cost of $20.60 and fixed costs of $28,000.

	Per Unit	*Static Budget*	*Flexible Budget*	*Actual*	*Variance*
Volume		4,000	4,500	4,500	
Sales	$30	$120,000	$135,000	$130,500	$4,500 U
Variable costs	20	80,000	90,000	92,700	2,700 U
Contribution margin	$10	40,000	45,000	37,800	7,200 U
Fixed costs		30,000	30,000	28,000	2,000 F
Operating income		$10,000	$15,000	$9,800	$5,200 U

Master Budget Example

You have just been hired as a new management trainee by Earrings Unlimited, a distributor of earrings to various retail outlets located in shopping malls across the country. In the past, the company has done very little in the way of budgeting and at certain times of the year has experienced a shortage of cash.

Since you are well trained in budgeting, you have decided to prepare comprehensive budgets for the upcoming second quarter in order to show management the benefits that can be gained from an integrated budgeting program. To this end, you have worked with accounting and other areas to gather the information assembled below.

The company sells many styles of earrings, but all are sold for the same price-$l0 per pair. Actual sales of earrings for the last three months and budgeted sales for the next six months follow (in pairs of earrings):

January (actual)	20,000	June (budget)	50,000
February (actual)	26,000	July (budget)	30,000
March (actual)	40,000	August (budget)	28,000
April (budget)	65,000	September (budget)	25,000
May (budget)	100,000		

The concentration of sales before and during May is due to Mother's Day. Sufficient inventory should be on hand at the end of each month to supply 40% of the earrings sold in the following month.

Suppliers are paid $4 for a pair of earrings. One-half of a month's purchases is paid for in the month of purchase; the other half is paid for in the following month. All sales are on credit, with no discount, and payable within 15 days. The company has found, however, that only 20% of a month's sales are collected in the month of sale. An additional 70% is

collected in the following month, and the remaining 10% is collected in the second month following sale. Bad debts have been negligible.

Monthly operating expenses for the company are given below:

Variable:	
Sales commissions	4% of sales
Fixed:	
Advertising	$200,000
Rent	18,000
Salaries	106,000
Utilities	7,000
Insurance expired	3,000
Depreciation	14,000

Insurance is paid on an annual basis, in November of each year.

The company plans to purchase $16,000 in new equipment during May and $40,000 in new equipment during June; both purchases will be for cash. The company declares dividends of $15,000 each quarter, payable in the first month of the following quarter.

A listing of the company's ledger accounts as of March 31 is given below:

Assets	
Cash	$ 74,000
Accounts receivable	346,000
Inventory	104,000
Prepaid insurance	21,000
Property and equipment (net)	950,000
	$1,495,000
Liabilities and Shareholders' Equity	
Accounts payable	$ 100,000
Dividends payable	15,000
Capital stock	800,000
Retained earnings	580,000
	$1,495,000

Part of the use of the budgeting program will be to establish an ongoing line of credit at a local bank. Therefore, determine the borrowing that will be needed to maintain a minimum cash balance of $50,000. All borrowing will be done at the beginning of a month; any repayments will be made at the end of a month.

The annual interest rate will be 12%. Interest will be computed and paid at the end of each quarter on all loans outstanding during the quarter. Compute interest on whole months (1/12, 2/12, and so forth).

Required –

Prepare a master budget for the three-month period ending June 30. Include the following detailed budgets:

1. a. A sales budget, by month and in total.
   b. A schedule of expected cash collections from sales, by month and in total.
   c. A merchandise purchases budget in units and in dollars. Show the budget by month and in total.
   d. A schedule of expected cash disbursements for merchandise purchases, by month and in total.
2. A cash budget. Show the budget by month and in total.
3. A budgeted income statement for the three-month period ending June 30. Use the contribution approach.
4. A budgeted balance sheet as of June 30.

SOLUTION

		April	*May*	*June*	*Total*
1a.	Sales (in units)	65,000	100,000	50,000	215,000
	Unit selling price	$10	$10	$10	$10
	Sales	$650,000	$1,000,000	$500,000	$2,150,000
1b.	Feb: $260,000 x 10%	$26,000			$26,000
	Mar: $400,000				
	x 70% | 10%	280,000	$40,000		320,000
	Apr: $650,000				
	x 20% | 70% | 10%	130,000	455,000	$65,000	650,000
	May: $1,000,000				
	x 20% | 70%		200,000	700,000	900,000
	Jun: $500,000 x 20%			100,000	100,000
	Budgeted Cash Collections	$436,000	$695,000	$865,000	$1,996,000
1c.	Needs: COGS	$260,000	$400,000	$200,000	$860,000
	Ending Inventory	160,000	80,000	48,000	48,000
	Less Opening Inventory	(104,000)	(160,000)	(80,000)	(104,000)
	Budgeted purchases	$316,000	$320,000	$168,000	$804,000
1d.	March purchases	$100,000			$100,000
	April purchases	158,000	158,000		316,000
	May purchases		160,000	160,000	320,000
	June purchases			84,000	84,000
	Budgeted cash disbursements on purchases	$258,000	$318,000	$244,000	$820,000

		April	*May*	*June*	*Total*
2.	Cash, beginning	$74,000	$50,000	$50,000	$74,000
	Cash Collections	436,000	695,000	865,000	1,996,000
	Cash Disbursements				
	On Purchases	-258,000	-318,000	-244,000	-820,000
	Sales commissions	-26,000	-40,000	-20,000	-86,000
	Advertising	-200,000	-200,000	-200,000	-600,000
	Rent	-18,000	-18,000	-18,000	-54,000
	Salaries	-106,000	-106,000	-106,000	-318,000
	Utilities	-7,000	-7,000	-7,000	-21,000
	Equipment		-16,000	-40,000	-56,000
	Dividends	-15,000			-15,000
	Cash balance before financing	-120,000	40,000	280,000	100,000
	Interest*			-5,300	-5,300
	Borrowings/Repayments	170,000	10,000	-180,000	0
	Cash, end	$50,000	$50,000	$94,700	$94,700

* (170,000 x 1%) + (180,000 x 1%) + (180,000 x 1%) = 5,300

3. *Earrings Unlimited*
Budgeted Income Statement and Statement of Retained Earnings
For the year three month period ended June 30

Sales		$2,150,000
Variable costs		
Cost of goods sold	$860,000	
Sales commission	86,000	946,000
Contribution margin		1,204,000
Fixed costs		
Advertising	600,000	
Rent	54,000	
Salaries	318,000	
Utilities	21,000	
Insurance	9,000	
Depreciation	42,000	1,044,000
Operating income		160,000
Interest expense		5,300
Net income		154,700
Retained earning, beginning		580,000
Dividends		15,000
Retained earnings, ending		$719,700

4. *Earrings Unlimited*
Budgeted Balance Sheet
As at June 30

Cash	$94,700
Accounts receivable ($1,000,000 x 10% + $500,000 x 80%)	500,000
Inventory	48,000
Prepaid insurance ($21,000 – 9,000)	12,000
Property and equipment ($950,000 + 56,000 – 42,000)	964,000
	$1,618,700
Accounts payable	$84,000
Dividends payable	15,000
Capital stock	800,000
Retained earnings	719,700
	$1,618,700

Variance Analysis example – using the following standard cost card and additional information, calculate all cost variances:

Direct materials, 20 meters at $0.90 per meter	$18
Direct labour, 4 hours at $6 per hour	24
Variable overhead, 4 hours at $3.75 per hour	15
Fixed overhead, 4 hours at $1.25 per hour	5
	$62

Static budgeted volume (units) – 600

Materials purchased - 18,000 meters at $0.92 per meter
Materials used - 9,500 meters
Direct labour – 2,100 hours at $6.10 per hour
Actual variable overhead costs - $8,750
Actual fixed overhead costs - $3,100

Direct materials price variance = AQP (AP – SP)
= 18,000 (0.92 – 0.90)
= $360 U

Direct materials usage (quantity) variance = SP (AQU – SQA)
= $0.90 [9,500 – (500 x 20)]
= $0.90 (9,500 – 10,000)
= $450 F

Direct labour rate variance = AH (AR – SR)
= 2,100 (6.10 – 6.00)
= $210 U

Direct labour efficiency variance = SR (AH – SHA)
= $6.00 [2,100 – (500 x 4)]
= $6.00 (2,100 – 2,000)
= $600 U

Variable overhead spending variance = AH (AR – SR)
= 2,100 ($8,750 / 2,100 – 3.75)
= 2,100 ($4.16687 – 3.75)
= $875 U

Variable overhead efficiency variance = SR (AH – SHA)
= $3.75 (2,100 – 2,000)
= $375 U

Fixed overhead spending variance = FOH Budget – FOH Actual
= (600 x $5) – 3,100
= $100 U

Fixed overhead volume variance = FOH Budget – FOH Applied
= $3,000 – (500 x $5)
= $500 U

Sum of the four overhead variances = $1,850 U = total underapplied overhead:

Actual overhead (total) = $8,750 + 3,100	$11,850
Overhead applied: 500 units x $20	10,000
Under-applied overhead	$1,850

Responsibility Accounting Example

Osti Industries produces tool and die machinery for manufacturers. The company expanded vertically in 20x4 by acquiring one of its suppliers of alloy steel plates, Robertson Steel Company. In order to manage the two separate businesses, the operations of Robertson are reported separately as an investment center.

Osti monitors its divisions on the basis of both unit contribution and return on average investment (ROI), with investment defined as average operating assets employed. Management bonuses are determined on ROI. All investments in operating assets are expected to earn a minimum return of 11% before income taxes.

Robertson's cost of goods sold is considered to be entirely variable while the division's administrative expenses are not dependent on volume. Selling expenses are a mixed cost with 40% attributed to sales volume. Robertson's ROI has ranged from 11.8% to 14.7% since 20x4. During the fiscal year ended November 30, 20x9, Robertson contemplated a capital acquisition with an estimated ROI of 11.5%; however, division management decided against the investment because it believed that the investment would decrease Robertson's overall ROI.

The 20x9 operating statement for Robertson follows. The division's operating assets employed were $15,750,000 at November 30, 20x9, a 5% increase over the 20x8 year-end balance.

Robertson Steel Division
Operating Statement
For The Year Ended November 30, 20x9
($000 Omitted)

Sales revenue		$25,000
Less expenses:		
Cost of goods sold	$16,500	
Administrative expenses	3,955	
Selling expenses	2,700	23,155
Income from operations before income taxes		$ 1,845

Required -

a. Calculate the unit contribution for Robertson Steel Division if 1,484,000 units were produced and sold during the year ended November 30, 20x9.

b. Calculate the following performance measures for 20x9 for the Robertson Steel Division:
   1. Pretax return on average investment in operating assets employed (ROI).
   2. Residual income (RI) calculated on the basis of average operating assets employed.

c. Explain why Robertson management would have been more likely to accept the contemplated capital acquisition if RI rather than ROI had been used as a performance measurement.

a.

Sales revenue per unit: $25,000 / 1,484	$16.85
Cost of goods sold: $16,500 / 1,484	(11.12)
Variable selling: $2,700 x 40% / 1,484	(0.73)
Contribution margin per unit	$5.00

b. 1. Average assets = [(15,750,000 / 1.05) + 15,750,000] / 2
= (15,000,000 + 15,750,000) / 2
= $15,375,000

ROI = $1,845 / 15,375 = 12%

2. RI = $1,845,000 – (15,375,000 x 11%)
= $1,845,000 – 1,691,250
= $153,750

c. Accepting the new investment would have increased RI.

Capital Budgeting Problem

The St. Paul Railroad is considering replacement of a Kalamazoo Power Jack Tamper, used for maintenance of track, with a new automatic raising device that can be attached to a production tamper.

The present power jack tamper cost $18,000 five years ago and has a total estimated life of 17 years. A year from now the machine will require a major overhaul estimated to cost $5,000. It can be disposed of now via an outright cash sale for $2,500. There will be no value at the end of twelve years.

The automatic raising attachment has a delivered selling price of $124,000 and an estimated life of twelve years. Estimated sales value at the end of twelve years is $10,000.

Tests have shown that the automatic raising machine will produce a more uniform surface on the track than the power jack tamper now in use. The new equipment will eliminate one labourer whose annual compensation, including fringe benefits, is $30,000

The salesperson claims that the annual normal maintenance of the new machine will run about $8,000 per year. Because the automatic raising machine is more complicated than the manually operated machine, it is felt that it will require a thorough overhaul at the end of the 8^{th} year at an estimated cost of $20,000.

Records show the annual normal maintenance of the current Kalamazoo machine to be $1,500. Fuel consumption of the two machines is equal.

Required -

Should the St. Paul keep or replace the Kalamazoo Power Jack Tamper? The cost of capital is 10%. Compute present values. Ignore income taxes.

Initial investment ($124,000 – 2,500)	($121,500)
Overhaul on manual jack tamper saved: N = 1, I = 10, FV = 5,000, Solve for PV =	4,545
Annual labour savings N = 12, I = 10, PMT = 30,000, Solve for PV =	204,411
Annual increase in operating costs N = 12, I = 10, PMT = (8,000 – 1,500), Solve for PV =	(44,289)
Overhaul of automatic machine: N = 8, I = 10, FV = 20,000, Solve for PV =	(9,330)
Salvage value at the end of the 12^{th} year N = 12, I = 10, FV = 10,000, Solve for PV =	3,186
Net present value	$37,023

Recommend they purchase the automatic machine.