MANAGEMENT ACCOUNTING
Solution to Tutorial Question One

1. High-low method

Variable cost per hour (b) = $\frac{y2-y1}{x2-x1}$, Where:
Y_2 is the cost at the highest activity level
Y_1 is the cost at the lowest activity level
X_2 is the number of units at the highest activity level
X_1 is the number of units at the lowest activity level

High: 1,900 hours→GHS15,200
Low: 1,100 hours→GHS12,800

(A)

$$= \frac{GHS15,200-GHS12,800}{1,900\ hours-1,100 hours}$$

$$= \frac{GHS2,400}{800\ hours}$$

= GHS 3 per hour

➔Y=3x+a
From y=3x+a, a=y-3x
Where y=GHS15,200 and x=1,900 hours,
a = GHS15,200 -GHS3(1900)
= GHS15,200 - GHS5,700
= GHS9,500

Where y=GHS12,800 and x=1,100 hours,
a = GHS12,800 -GHS3(1100)
= GHS12,800 – GHS3,300
= GHS9,500

➔y=3x+9,500, where
Y➔total cost
3x➔variable component, made up of:
3➔variable cost per unit
X➔activity level
GHS9,500➔fixed component

(B) Y=GHS3x+GHS9,500
If x=1910 hours,
Y = GHS3(1,910) + GHS9,500
= GHS5,730 + GHS9,500
= GHS15,230

If x=2,200 hours,
Y = GHS3(2,200) + GHS9,500
= GHS6,600 + GHS9,500
= GHS16,100

(C) From y=3x + 9,500,

$X = \frac{y-9{,}500}{3}$

If y=GHS15,100,

$X = \frac{GHS15{,}100-GHS9{,}500}{GHS3}$

$= \frac{GHS5{,}600}{GHS3}$

= 1,867 hours

If y=GHS17,100,

$X = \frac{GHS17{,}100-GHS9{,}500}{GHS3}$

$= \frac{GHS7{,}600}{GHS3}$

= 2,533 hours

2. Least Squares Method

(I) (A)

X: Direct Labour Hours	Y: Maintenance Cost (GHS)	XY	X^2
1,700	14,300	24,310,000	2,890,000
1,900	15,200	28,880,000	3,610,000
1,800	16,700	30,060,000	3,240,000
1,600	14,000	22,400,000	2,560,000
1,500	14,300	21,450,000	2,250,000
1,300	13,000	16,900,000	1,690,000
1,100	12,800	14,080,000	1,210,000
1,400	14,200	19,880,000	1,960,000
12,300	**114,500**	**177,960,000**	**19,410,000**

n=8

$\sum x$=12,300

$\sum y$=114,500

$\sum x^2$=19,410,000

$\sum xy$= 177,960,000

$b = [n(\sum xy) - (\sum x)(\sum y)] / [n(\sum x^2)-(\sum x)^2]$

$= \frac{8(177{,}960{,}000)-(12{,}300)(114{,}500)}{8(19{,}410{,}000)-(12{,}300)(12{,}300)}$

$= \frac{GHS15{,}330{,}000}{GHS3{,}990{,}000}$

= 3.84

$a = [\sum y - b\sum x]/n$

$= \frac{114{,}500-3.84(12{,}300)}{8}$

= GHS8405.27

➔y = 3.84x + 8405.27, where

Y➔total cost

3.84x➔variable component, made up of:

3.84➔variable cost per unit

X➔activity level

GHS8,405.27➔fixed component

(B) $y = 3.84x + 8405.27$

If x=1,910 hours

$Y = GHS3.84(1{,}910) + GHS8{,}405.27$
$= GHS7{,}334.5 + GHS8{,}405.27$
$= GHS15{,}739.67$

If x=2,200 hours

$Y = GHS3.84(2{,}200) + GHS8{,}405.27$
$= GHS8{,}448.5 + GHS8{,}405.27$
$= GHS16{,}853.27$

(C) From $y = 3.84x + 8405.27$, $x = \frac{y-8{,}405.27}{3.84}$

If y=GHS15,100,

$X = \frac{15{,}100-8{,}405.27}{3.84}$

$= \frac{6{,}694.73}{3.84}$

$= 1{,}743$ hours

If y=GHS17,100,

$X = \frac{17{,}100-8{,}405.27}{3.84}$

$= \frac{8{,}694.73}{3.84}$

$= 2{,}264$ hours

(II) (A)

X	Y	x-ẋ (x-1,537.5)	y-ẏ (y-14,312.5)	(x-ẋ)(y-ẏ)	$(x\text{-}\dot{x})^2$
1,700	14,300	162.5	-12.5	-2,301.25	26,406.25
1,900	15,200	362.5	887.5	321,718.75	131,406.25
1,800	16,700	262.5	2,387.5	626,718.75	68,906.25
1,600	14,000	62.5	-312.5	-19,531.25	3,906.25
1,500	14,300	-37.5	-12.5	468.75	1,406.25
1,300	13,000	-237.5	-1,312.5	311,718.75	56,406.25
1,100	12,800	-437.5	-1,512.5	661,718.75	191,406.25
1,400	14,200	-137.5	-112.5	15,468.75	18,906.25
12,300	**114,500**			**1,916,250.00**	**498,750.00**

$n = 8$
$\dot{x} = \sum x/n$
$= 12{,}300/8$
$= 1{,}537.5$

$\dot{y} = \sum y/n$
$= 114{,}500/8$
$= 14{,}312.5$

$\sum(x-\dot{x})(y-\dot{y}) = 1{,}916{,}250$

$\sum(x-\dot{x})^2 = 498{,}750$

$b = [\sum(x-\dot{x})(y-\dot{y})] / \sum(x-\dot{x})^2$

$= \frac{1{,}916{,}250}{498{,}750}$

$= 3.84$

$a = \dot{y} - b\,\dot{x}$
$= 14{,}312.5 – 3.84\ (1{,}537.5)$
$= 8{,}405.27$

➔ y = 3.84x + 8405.27, where

Y➔total cost
3.84x➔variable component, made up of:
3.84➔variable cost per unit
X➔activity level
GHS8,405.27➔fixed component

(B) y = 3.84x + 8405.27
If x=1,910 hours
Y = GHS3.84(1,910) + GHS8,405.27
= GHS7,334.5 + GHS8,405.27
= GHS15,739.67

If x=2,200 hours
Y = GHS3.84(2,200) + GHS8,405.27
= GHS8,448.5 + GHS8,405.27
= GHS16,853.27

(C) From y = 3.84x + 8405.27, $x = \frac{y-8{,}405.27}{3.84}$

If y=GHS15,100,
$X = \frac{15{,}100-8{,}405.27}{3.84}$

$= \frac{6{,}694.73}{3.84}$

= 1,743 hours

If y=GHS17,100,
$X = \frac{17{,}100-8{,}405.27}{3.84}$

$= \frac{8{,}694.73}{3.84}$

= 2,264 hours

NB:

Advantages of High Low Method

Using the high low method offers the following benefits:

Easy to use

The high-low method only requires the cost and unit information at the highest and lowest activity level to get the required information. Managers can implement this technique with ease since it does not require any special tools.

High accuracy with stable costs

The high low method can be relatively accurate if the highest and lowest activity levels are representative of the overall cost behavior of the company. However, if the two extreme activity levels are systematically different, then the high-low method will produce inaccurate results.

Disadvantages of High Low Method

The high low method comes with the following disadvantages:

Unreliable

The method does not represent of all the data provided since it relies on just two extreme activity levels. The activity levels may not be representative of the costs incurred due to outlier costs that are higher or lower than what the organization incurs in the other activity levels.

Does not account for inflation

The high-low method excludes the effects of inflation when estimating costs.

Least-Squares Regression

Perhaps the biggest drawback of the high-low method is not inherent within the method itself. With the prevalence of spreadsheet software, least-squares regression, a method that takes into consideration all of the data, can be easily and quickly employed to obtain estimates that may be magnitudes more accurate than high-low estimates. Least-squares regression uses statistics to mathematically optimize the cost estimate. Further, because this method uses all of the data available, small idiosyncrasies in cost behavior have less effect on the estimate as the amount of data increases.