REFORMED CHURCH UNIVERSITY

FACULTY OF COMMERCE

Bachelor of Commerce Honours Degree in Business Management

Business Mathematics

HBUM 102/HLSM 108

Part 1 Semester 1 Examination

Total Marks [100]

Date: June 2020

Time: 3 Hours

INSTRUCTIONS

1. This paper has ***six (6)*** questions
2. Answer question ***one (1)*** and ***any*** other ***three (3)***
3. Each question carries ***25 marks***
4. Start each question on a new page
5. Use of non-programmable scientific calculators is permissible

1. (a). A vendor bought some mangoes at $3 each. She finds that 5 of them are bad. She sells the rest at $7 each and makes a profit of $61. How many oranges did she buy? (10)

(b). A Print-flow finds that the fixed cost associated with producing a new school register is $3000. Each register costs $2 to produce and will sell for $5.

i. Formulate the cost and revenue equations. (2)
ii. Hence, find the Print-flow's breakeven point. (5)
iii. How many registers should be sold to realise some profit? (2)

(c). Given that Q_s –quantity supplied
Q_d- quantity supplied
P-price
And equations: $Q_s=130+7p$ and $Q_d=460-4p$
Calculate the equilibrium price for the apple market by using the supply and demand equations above. Show all necessary steps to solve for p. (6)

2. The following data shows daily sales (in dollars) of a tuck shop owner over 15 randomly selected days:
27 24 45 41 28 36 54 24
27 40 24 34 38 29 25

a) Find the
i. Mode (2)
ii. Median (2)

b) Calculate
i. Mean (3)
ii. Variance (5)
iii. Standard deviation (2)

(c) The amount (to the nearest $) spend by 240 shoppers at a supermarket were recorded and tabulated below:

Amount spend($)	0-14	15-29	30-44	45-59	60-74	75-89	90-104
Number of shoppers	10	15	23	40	70	57	25

i. Calculate the mean. (3)
ii. Draw a histogram to represent this information and comment on the distribution of the amounts spend by shoppers. (8)

3. (a) Briefly explain the importance of linear programming in business management. (5)

(b) A small business enterprise makes skirts and blouses. To make a skirt requires 40 minutes of cutting and 15 minutes stitching. To make a blouse requires 20 minutes of cutting time and half an hour stitching. The profit on skirt is $40 and of blouse is $50. The business operates for a maximum of 9 hours per day. By showing all steps, determine how many skirts and blouses should be made to maximise profit and what the maximum profit is. (20)

4. (a) Distinguish between simple interest and compound interest. (5)

(b) If a deposit of $4 000 at 8% annual interest is compounded quarterly, how much will be in the account after 6 years? (6)

(c) How much does a company needs to deposit today at 5% annual interest compounded monthly to have $15 000 in 8 years. (6)

(d) (i) What will be the value of $20 000 at the end of 5 years with continuous compounding at 6% rate annual rate of interest? (6)

(ii) What is the effective interest rate when 7% annual rate is compounded continuously? (2)

5. (a) State the importance of measures of dispersion. (5)

(b) Two machines X and Y are used to pack chips. A sample of 10 packets was taken from each machine and mass of each packet, measured to the nearest gram, noted. The following results were obtained from the samples:

Machine X: $\sum x = 2\,000$, $n=10$, $\sum x^2 = 400\,056$

Machine Y: $\sum x = 2\,000$, $n=10$, $\sum x^2 = 400\,240$

i. Calculate the mean, variance and standard deviation of the packets taken in the sample for each machine, Comment on your standard deviations. (12)

ii. Calculate the coefficient of variation for both of the machines and give a comment. (6)

iii. As a manager of a company which machine would you prefer and give reason(s). (2)

6. A large field used for growing potatoes was divided into 6 equal plots, and each plot was treated with a different concentration of a certain fertilizer. At harvest time the yield from each plot was recorded and the results are given in the table with potatoes yield (Y kg) and fertilizers concentration (Cg l^{-1})

Concentration [(X)g]	0.5	1	2	3	4	6

Yield (Y)kg	10	16	26	36	50	72

i. Draw a scatter plot of the data and comment on the relationship shown. (5)

ii. Estimate the regression equation. (8)

iii. Estimate the yield of the plot which had a concentration of 5g. (2)

iv. Interpret the slope coefficient of the regression equation. (2)

v. Find the coefficient of determination and comment on its magnitude. (8)

End of Paper