

THE PUBLIC ACCOUNTANTS EXAMINATIONS BOARD

A Committee of the Council of ICPAU

ATC(U) EXAMINATIONS

LEVEL ONE

BUSINESS MATHEMATICS & STATISTICS - PAPER 3

WEDNESDAY, 22 JUNE 2005

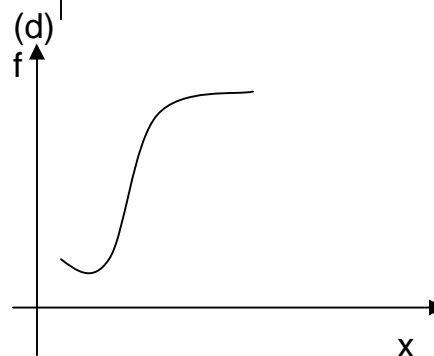
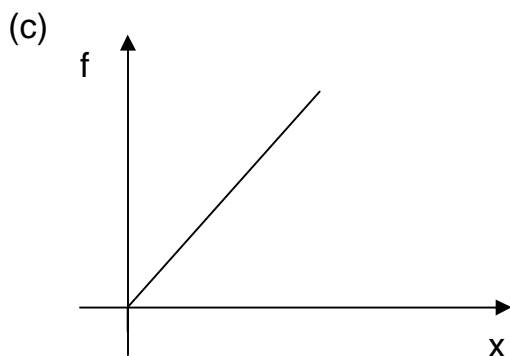
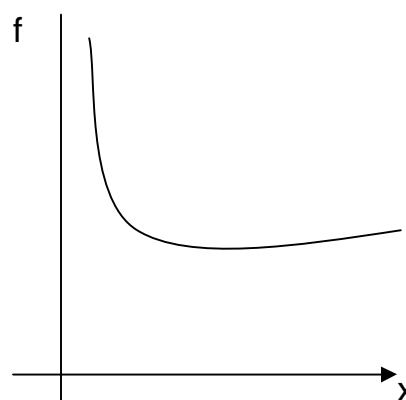
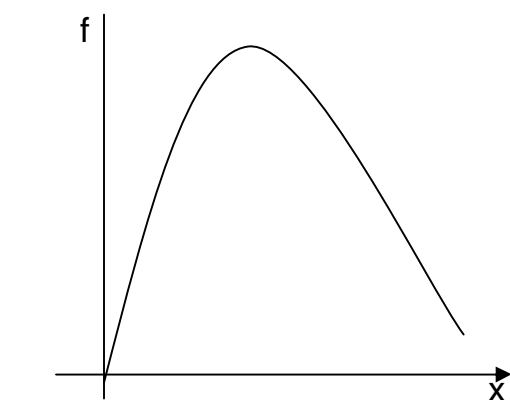
INSTRUCTIONS TO CANDIDATES:

1. Time allowed: **3 hours**
2. Attempt **all** questions in Section A, any **two** questions in Section B and any **two** questions in Section C.
3. Section A has **twenty** compulsory multiple-choice questions, each carrying 1½ marks.
4. Section B has **three** questions and only **two** are to be attempted. Each question carries 20 marks.
5. Section C has **three** questions and only **two** are to be attempted. Each question carries 15 marks.
6. Please read further instructions on the answer booklet.

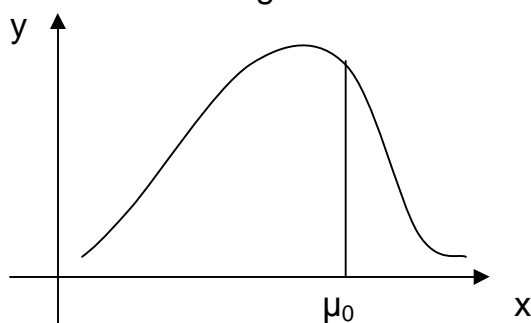
SECTION A

Question 1

- (i) Which of the following is not a measure of dispersion?
- Mean.
 - Standard deviation.
 - Variance.
 - Mean deviation.
- (ii) Which of the following is a qualitative variable?
- Taste.
 - Height.
 - Cinema attendance.
 - Temperature.
- (iii) Which of the following are sources of data collection?
- Census.
 - Local Council (LC) Register.
 - Vital Registration System.
 - Referendum.
- (iv) Which of the following is a sketch of cumulative frequency curve)



- (v) Which of the following best describes this curve?



- (a) Bimodal distribution.
 (b) Negative skewed.
 (c) Positive skewed.
 (d) Statistical curve.
- (vi) Identify the magnitude of the class width, in the table below:

Class years	2 - 4	5 - 7	8 - 10
Frequency	30	30	30

- (a) 30
 (b) 2
 (c) 3
 (d) 199
- (vii) Simplify the following expression: $\frac{2^3 \times 16}{2^{-4}}$
- (a) 2^3
 (b) 2^4
 (c) 2^{-10}
 (d) 2^{11}
- (viii) If £ 280 is invested in a government stock which pays 3.25% per annum, find the interest per half a year.
- (a) £ 910
 (b) £ 4.55
 (c) £ 455
 (d) £ 9.1
- (ix) It is projected x years from now, that the GDP of a certain country will be $G(x) = 2x + 4x^{-3/2} + \text{Shs } 500$ billion. How fast will the GDP change 4 years from now?
- (a) 56
 (b) 18
 (c) 14
 (d) 28

- (x) Property Dealers Ltd is a new company facing problems as a result of falling annual revenue. Its annual revenue at the beginning of 2000 was recorded as \$ 20,000. It has been falling at a rate of 1.6% per annum over the years. What will be the company's annual revenue at the end of the year 2004?
- (a) \$ 19,680
 - (b) \$ 21,652
 - (c) \$ 18,750.40
 - (d) \$ 18,450.40
- (xi) Find the simple interest on Shs 500,000 for three years at 10% per annum.
- (a) Shs 150,000.
 - (b) Shs 165,500.
 - (c) Shs 650,000.
 - (d) Shs 665,500.
- (xii) Which of the following is not a type of annuity?
- (a) Ordinary annuity.
 - (b) Due annuity.
 - (c) Contingent annuity.
 - (d) Essential annuity.
- (xiii) The weight of rice bags bought by Progressive High School are normally distributed, with mean 5kgs and standard deviation 0.2kgs. Rice is delivered to the school. What is the probability that a random bag will weigh more than 5.5kg?
- (a) 0.9938
 - (b) 1.0
 - (c) 0.0068
 - (d) 0.0325
- (xiv) Find the turning point of the following equation: $3x^2 - 12x + 4 = y$.
- (a) (2, -8)
 - (b) (8, 2)
 - (c) (-8, 2)
 - (d) (2, 8)
- (xv) The cost C for a firm producing q units of a product $C = 3q \ln q + 60$. Evaluate the cost when 10 units are produced.
- (a) 1.291×10^2
 - (b) 6.3×10^1
 - (c) 9.0×10^1
 - (d) 6.691×10^1

- (xvi) 13 different balls are to be placed in 18 bags, not more than one ball being placed in each. What is the probability that a particular bag received a ball?
- (a) 1
 - (b) $\frac{13}{5}$
 - (c) $\frac{13}{18}$
 - (d) $\frac{13}{15}$
- (xvii) Find the geometric mean of the following numbers: 4, 10, 25.
- (a) 31
 - (b) 10
 - (c) 5
 - (d) 9.5
- (xviii) Solve the following quadratic equation $2x^2 - 5x - 12 = 0$.
- (a) $-\frac{3}{2}, 4$
 - (b) $-4, -\frac{3}{2}$
 - (c) $4, \frac{3}{2}$
 - (d) $4, -4$
- (xix) A plane whose cost is £ 200,000 will depreciate to a scrap value of £ 100,000 in 4 years. Find its depreciation rate, using the reducing balance method of depreciation.
- (a) 91.6%
 - (b) 1%
 - (c) 84.1%
 - (d) 5%
- (xx) A tourist arrived in Uganda with 2,200 euros. He decided to change all his money to Uganda shillings paying a bank charge of 1%. He spent UShs 458,000 on hotel bills and UShs 100,000 for travel and his entertainment. After his tour he changed his remaining money back to Euros, again paying a bank charge of 1%. How many Euros did he receive back? Forex rates at Stanhope for 1 Euro are Shs 2,225 buying and Shs 2,250 selling.
- (a) 1915.48
 - (b) 1909.05
 - (c) 1896.33
 - (d) 1928.34

SECTION B**Question 2**

- (a) Define a matrix. (2 marks)
- (b) State two benefits of using matrices in storing business information. (2 marks)
- (c) Given the following matrices:
- $$M = \begin{Bmatrix} -3 & 0 \\ 2 & 1 \end{Bmatrix} \quad N = \begin{Bmatrix} 5 & 7 \\ -2 & 1 \end{Bmatrix}$$
- Find $2M - N$ (5 marks)
- (d) 2 Companies: Jeff Enterprises and Bill Enterprises produce three brands of spirits: Vodka, Pure Gins and Teachers. Jeff produces 200 litres of Vodka, 50 litres of Pure Gin and 100 litres of Teachers in a week. Bill produces 350 litres of Pure Gin, 100 litres of Vodka and 250 litres of Teachers. In both companies, the production of Vodka is Shs 50 per litre, Shs 100 for Pure Gin and Shs 20 for Teachers per litre respectively.
- (i) Arrange the above information in a 2×3 matrix for the products and a 3×1 matrix for the price.
- (ii) In which company would it be cheaper to produce the three brands weekly? (Assume the production environments are similar in both companies.) (11 marks)
- (Total 20 marks)**

Question 3

- (a) Define the following terms:
- (i) A set. (1 mark)
- (ii) A complementary set. (1 mark)
- (iii) A disjoint set. (1 mark)
- (iv) An equal set. (1 mark)
- (b) At the launching of the Association of Accounting Technicians of Uganda, 320 guests attended. Three brands of soda were served namely: Coke, Fanta and Citrus. Those who enjoyed Coke, Fanta and Citrus were 170, 200, and 120 respectively. Those who took Coke and Fanta were 120, Fanta and Citrus 90, Coke and Citrus were 80 guests. Given that those who enjoyed all the brands were equal to those who had no option, find:
- (i) The guests who enjoyed all the three brands.
- (ii) All the guests who were served with at least two brands.
- (iii) The guests who took only one brand. (9 marks)

- (c) (i) Draw a suitable statistical diagram to represent the following information:

Factory	Product X	Product Y	Product Z
A	40	60	20
B	28	48	20
C	26	34	30

(4 marks)

- (ii) List two advantages and one disadvantage of using the statistical diagram in c(i) above.

(3 marks)

(Total 20 marks)

Question 4

- (a) Solve for x and y in the equations:

$$\frac{1}{2}x + 3y - 20 = 0$$

$$2x + 2y - 10 = 0$$

(5 marks)

- (b) The demand and cost function of firm are defined by the following function:

$$MC = 900$$

$$P = 1500 - 2q$$

$$FC = 6000$$

Required:

Derive the:

- (i) Revenue function. (2 marks)
- (ii) Total profit function. (5 marks)
- (iii) Unit that must be produced in order to maximize profit. (4 marks)
- (iv) Maximum profit available in shillings. (4 marks)

(Total 20 marks)

SECTION C

Question 5

- (a) Define the following terms:

- (i) Complementary events.
- (ii) Independent events.
- (iii) Mutually exclusive events.
- (iv) Dependent events.

(8 marks)

- (b) Two events A and B are independent events. The probability that event A takes place is $\frac{1}{3}$. While that of B taking place is $\frac{3}{7}$. Calculate the probability that:

- (i) A and B take place simultaneously.
- (ii) A does not take place but B takes place.

(7 marks)
(Total 15 marks)

Question 6

- (a) Briefly describe the following measures:

- (i) Range **(1 mark)**
- (ii) Quartile **(1 mark)**
- (iii) Standard deviation **(1 mark)**

- (b) Below are marks scored by 15 ATC(U) students taking Principles of Accounting in a class test marked out of 50:

27, 13, 26, 18, 23, 21, 27, 44, 27, 44, 27, 37, 34, 26, 28

Compute and comment on the result of each of the following measures:

- (i) The range. **(1 mark)**
- (ii) The standard deviation. **(10 marks)**
- (iii) The variance of the distribution. **(1 mark)**

(Total 15 marks)

Question 7

- (a) Define the following terms:

- (i) Index numbers as a statistical measure. **(1 mark)**
- (ii) Base year. **(1 mark)**
- (iii) Current year. **(1 mark)**

- (b) A shirt cost Shs 6,000 in the year 2000 and in the year 2005 it is costing Shs 9,000. Taking 2000 as a base year, find the price relative of 2005 and comment on the result.

(3 marks)

- (c)

	1996		2000	
	Quantity	Price	Quantity	Price
Rice	40	1300	50	1400
Oats	20	3000	16	3200
Rye	10	300	16	200

Using the figures in the table above, calculate Paasche price index.

(7 marks)

- (d) Distinguish between Paasche price index and Paasche quantity index.

(2 marks)

(Total 15 marks)