

THE PUBLIC ACCOUNTANTS EXAMINATIONS BOARD

A Committee of the Council of ICPAU

ATC(U) EXAMINATIONS

LEVEL ONE

BUSINESS MATHEMATICS & STATISTICS - PAPER 3

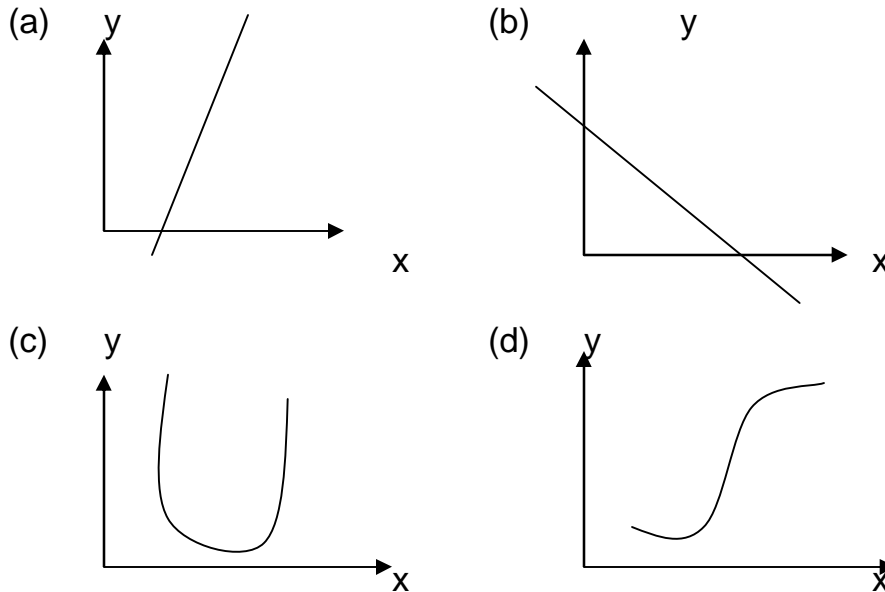
WEDNESDAY, 14 DECEMBER 2005

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 graphs shows a negative relationship?



(ii) Evaluate $\frac{(x^2 - 3y)^2}{y + 1}$ if $X = 3$ and $y = 2$

- (a) 3.
- (b) 1.
- (c) 6.25.
- (d) 75.

(iii) Which of the following situations or condition denotes a profitable investment?

- (a) $NPV > 0$.
- (b) $NPV < 0$.
- (c) $NPV = 1$.
- (d) $NPV \geq 1$.

(iv) Bob insures his life for 1 million shillings at a monthly premium of 50,000 shillings. What is the percentage of his annual premium of the sum insured?

- (a) 5%
- (b) 60%
- (c) 6%
- (d) 0.6%

- (v) If 6 Audit frames can finish an audit task in 5 days. How long would it take if 2 frames do the same piece of work?
- (a) 5 days.
 - (b) $\frac{5}{3}$ days.
 - (c) $2\frac{1}{2}$ days.
 - (d) 15 days.
- (vi) Find the logarithm of 365.4:
- (a) 2.5628.
 - (b) 0.5628.
 - (c) 2.6
 - (d) 2.552
- (vii) Find the ratio of 800m to 4km:
- (a) 200:1
 - (b) 1:200
 - (c) 1:4
 - (d) 1:5
- (viii) Which of the following best describes a sinking fund?
- (a) An investment that meets a known commitment.
 - (b) Used to repay debts.
 - (c) It is an outstanding amount.
 - (d) Helps to acquire new asset.

Use the following information to answer question (ix) and (x).



(ix) Find the $n(A^1 \cap B^1 \cap C)$:

- (a) 3
- (b) 0
- (c) 6
- (d) 5

(x) Find the $p(A \cup B)$

- (a) $\frac{4}{21}$
- (b) $\frac{9}{28}$
- (c) $\frac{5}{28}$
- (d) $\frac{9}{28}$

Consider the following geometric progression to answer question (xi) and (xii): 3, 9, 27, x, y.

(xi) Identify the values of **a** and **v** respectively in the above geometric progression.

- (a) 1, 3
- (b) 3, 1
- (c) $\frac{1}{3}$, 1
- (d) 1, $\frac{1}{3}$

(xii) Find the values of **x** and **y** respectively in the above geometric progression.

- (a) 243, 729.
- (b) 81, 243.
- (c) 729, 243.
- (d) 243, 81

(xiii) Find the present value of the 8 million after 3 years. If the interest rate is 20%.

- (a) 4,629.63
- (b) 4,000,000
- (c) 4,444,444.44
- (d) 4,624,271.46

(xiv) If $A = \begin{Bmatrix} 3 & 2 \\ 5 & -1 \end{Bmatrix}$ $B = \begin{Bmatrix} 2 & 0 \\ -3 & 6 \end{Bmatrix}$

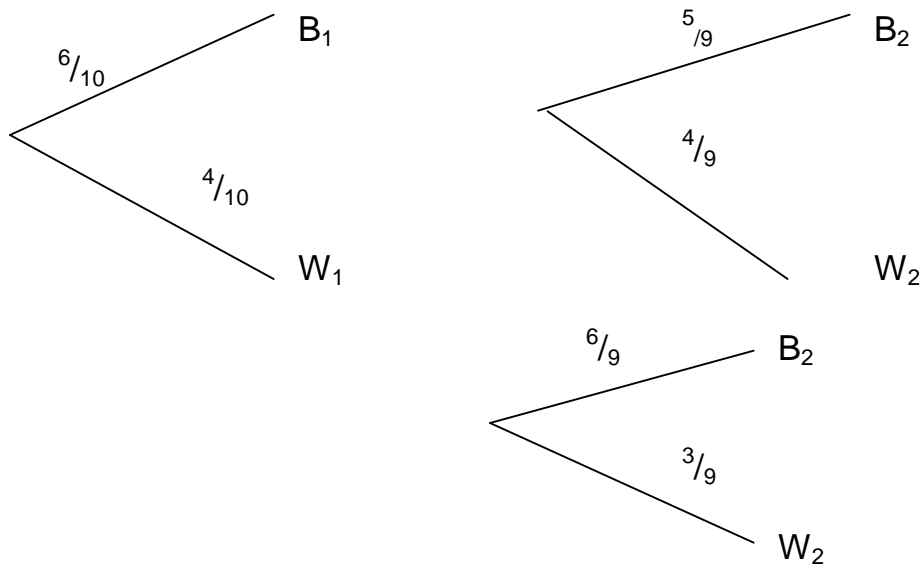
Find $\det A \cdot \det B$?

- (a) 156.
- (b) -1
- (c) 25
- (d) -156.

- (xv) The following are measures of central tendency except:
- (a) Mean.
 - (b) Geometric mean.
 - (c) Mode.
 - (c) Mean deviation.
- (xvi) Calculate the Harmonic mean of the following numbers. 1, 2, 2, 4, 8
- (a) 4.267
 - (b) 3.36
 - (c) 3.368
 - (d) 3.333

Use the following probability tree to answer question (xvii).

B denote black balls.
W denote white balls.



- (xvii) Find the probability of getting the same colour:
- (a) $\frac{7}{15}$
 - (b) $\frac{8}{9}$
 - (c) $\frac{23}{90}$
 - (d) $\frac{16}{90}$
- (xviii) The demand and cost functions of a firm are defined by the following functions.
- | | | | |
|----|---|-------------|------------------|
| MC | = | 500 | (Marginal cost) |
| P | = | $1000 - 3q$ | (Price function) |
| FC | = | 700 | (Fixed costs) |

Derive a total profit function of the firm:

- (a) $1000q - 3q^2$
 - (b) $3q^2 + 500q - 700$
 - (c) $500q + 700$
 - (d) $500q - 700$
- (xix) The projected annual sales of coke products in us dollars for century bottling company are given by equation $S = 2000,000 + 5000t$ where t is time in years for the year 2000. Find the projected annual sales for 2006.
- (a) \$ 5000
 - (b) \$ 230,000
 - (c) \$205.000
 - (d) \$ 203.000
- (xx) It is estimated that a second hand machine bought in Dubai will yield \$ 5000, for the next 3 years. At the end of the 3rd year, it will be a scrap. Calculate the purchase price of the machine to yield a return of 10% per annum.
- (a) 1130.4
 - (b) 1127.0
 - (c) 130
 - (d) 3756.57

SECTION B

Question 2

In the year 2000, 1000 students registered to attend ATC examinations. 50 of them did principles of Accounting I (A), 38 did Business Mathematics & Statistics (B) and 53 did Principles of Law 1 (L). 18 candidates did both A and B, 20 for A and C, and 13 for B and L. Only two candidates missed the examinations.

- (a) Put information on a venn diagram (8 marks)
- (b) Find the candidates who took
 - (i) all the three papers (4 marks)
 - (ii) only one examination (4 marks)
- (c) The probability that a candidate picked at random from the group sat for at least two examination papers.

(4 marks)
(Total 20 marks)

Question 3

- (a) Explain the following terms.
- (i) Depreciation (2 marks)
 - (ii) Mark up (2 marks)
 - (iii) Trade discount (2 marks)
 - (iv) A logarithm (2 marks)
- (b) Given $a = \begin{Bmatrix} 4 & 6 \\ 5 & 9 \end{Bmatrix}$ $B = \begin{Bmatrix} -2 & 2 \\ -5 & 3 \end{Bmatrix}$
- Find $\det A \cdot \det B$ (9 marks)
- (c) Simplify $\frac{2^{-4} \times 2^{-3}}{4^2}$

(3 marks)
(Total 20 marks)

Question 4

- (a) Find the point of equilibrium for the following demand and supply equation.
- $$\begin{aligned} Y &= 10 - 2x \\ Y &= \frac{3}{2}x + 1 \end{aligned}$$
- (7 marks)
- (b) A car seller sells all the car brands. The total cost of producing x cars a month is given by $600x + 4000$
- The demand function is estimated as $1000 - 49x$:
- (a) Derive a revenue function.
 - (b) The total profit function.
 - (c) How many cars should be produced in order to maximize profit?
 - (d) The maximum profit available.

(13 marks)
(Total 20 marks)

SECTION C

Question 5

The table below shows marks scored in a paper at an ATC sitting in 2003 for commercial environment marked out of 50.

Marks	10 - 14	15 - 19	20 - 24	30 - 34	35 - 39	45 - 50
Frequency	2	3	6	2	4	1

- (a) Compute the following measures:
- (i) Mean. (3 marks)
 - (ii) Variance. (3 marks)
 - (iii) Make a suitable frequency table. (6 marks)

- (b) Represent the information of a histogram and use it to find the mode.
(3 marks)
(Total 15 marks)

Question 6

- (a) Define the following terms and give one advantage of using the measure.
(i) Median. (2 marks)
(ii) Mode. (2 marks)

(b)

Items	1999 (P_0)	2000 (P_1)	Wt. (w)
Radio	56	60	4
Shoes	45	50	2
Nudities	15	20	1

- (i) Calculate the price relative for 2001 of each item using 1999 as the base year. (5 marks)
(i) The weighted price index for 2001. (3 marks)
(ii) Simple aggregate index number. (3 marks)
(Total 15 marks)

Question 7

- (a) Define the following sampling techniques and give two advantages of using them:
(i) Simple random sampling.
(ii) Stratified random sampling.
(iii) Purpose sampling. (9 marks)

- (b) The passing of an examination by a student in a particular year depended on payment of fees (A), attending classes (B) and reading privately (C).

The probability of a student failing to pay fees in a certain year is 0.2 and failing to attend classes 0.15 and failing to get time to read privately is 0.3.

Required:

What is the probability that in that year the candidate will fail?

(6 marks)
(Total 15 marks)