Pure Maths with Statistics 1
0770

GENERAL CERTIFICATE OF EDUCATION BOARD
General Certificate of Education Examination

JUNE 2025   **ADVANCED LEVEL**

Centre Number	
Centre Name	
Candidate Number	
Candidate Name	

Mobile phones are NOT allowed in the examination room.

MULTIPLE CHOICE QUESTION PAPER

Duration: One and a Half Hours

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you start answering the questions in this paper. Make sure you have a soft HB pencil and an eraser for this examination.
1.   USE A SOFT HB PENCIL THROUGHOUT THE EXAMINATION.
2.   DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.
Before the examination begins:
3.   Check that this question booklet is headed "**Advanced Level – 0770 Pure Maths with Statistics 1**".

4.   Fill in the information required in the spaces above.

5.   Fill in the information required in the spaces provided on the answer sheet using your HB pencil:
        Candidate Number and Name, Centre Number and Name.
        Take care that you do not crease or fold the answer sheet or make any marks on it other than those asked for in these instructions.

6.   *Answer All questions.*

7.   **Formulae Booklets and calculators are allowed.**

8.   Each question has FOUR suggested answers: **A, B, C** and **D**. Decide on which answer is correct. Find the number of the question on the Answer Sheet and draw a horizontal line across the letter to join the square brackets for the answer you have chosen.
        For example, if **C** is your correct answer, mark **C** as shown below:

                              [A] [B] [C̶] [D]

9.   Mark only one answer for each question. If you mark more than one answer, you will score a zero for that question. If you change your mind about an answer, erase the first mark carefully, then mark your new answer.

10.   Avoid spending too much time on any one question. If you find a question difficult, move on to the next question. You can come back to this question later.

11.   Do all rough work in this booklet, using, where necessary, the blank spaces in the question booklet.

12.   **At the end of the examination, the invigilator shall collect the answer sheet first then the question booklet after. DO NOT ATTEMPT TO LEAVE THE EXAMINATION HALL WITH IT.**

Turn Over

SECTION A: PURE MATHEMATICS

1. Given that f: $\mathbb{R} \rightarrow \mathbb{R}$, where $f(x) = \frac{x+2}{x+1}$, the range of f is

   A $\{x \in \mathbb{R}, x \neq 1\}$
   B $\{x \in \mathbb{R}, x \neq -2\}$
   C $\{x \in \mathbb{R}, x \neq -1\}$
   D $\{x \in \mathbb{R}, x \neq 2\}$

2. If functions g : $\mathbb{R} \rightarrow \mathbb{R}$ and h: $\mathbb{R} \rightarrow \mathbb{R}$ are such that $g(x) = 3x - 2$ and $h(x) = x - 1$, then $(g \circ h)(x) =$

   A $3x + 3$
   B $3x - 3$
   C $3x - 5$
   D $3x + 5$

3. If matrix $A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$, then the cofactor of the element 6 is

   A $\begin{vmatrix} 1 & 2 \\ 7 & 8 \end{vmatrix}$
   B $-\begin{vmatrix} 1 & 2 \\ 7 & 8 \end{vmatrix}$
   C $6\begin{vmatrix} 1 & 2 \\ 7 & 8 \end{vmatrix}$
   D $-6\begin{vmatrix} 1 & 2 \\ 7 & 8 \end{vmatrix}$

4. If $\frac{2x+1}{(1-x)(2+x)} \equiv \frac{A}{1-x} + \frac{B}{2+x}$, then

   A $A = 1, B = 1$
   B $A = 1, B = -1$
   C $A = -1, B = -1$
   D $A = -1, B = 1$

5. The normal vector to the plane $6x + 2y - 7z - 12 = 0$ is

   A $-6i - 2j + 7k$
   B $6i + 2j - 12k$
   C $6i - 2j - 12k$
   D $6i + 2j - 7k$

6. α and β are roots of a quadratic equation such that $\alpha + \beta = 3$ and $\alpha\beta = \frac{3}{2}$.
   The value of $\alpha^2 + \beta^2$ is
   A 12
   B 5
   C 6
   D 9

7. When $f(x) = 2x^3 + x^2 - 13x + 6$ is divided by $(x + 1)$ the remainder is
   A 20
   B -4
   C 18
   D -6

8. The range of values of x for which $|x + 4| \leq 2$ is

   A $x \leq -6$
   B $x \leq -6$ or $x \geq -2$
   C $x \geq -2$
   D $-6 \leq x \leq -2$

9. If $\sin\theta = \frac{4}{5}$ and θ is an acute angle, then the exact value of $2\sin\theta\cos\theta$ is

   A $\frac{24}{25}$
   B $\frac{16}{25}$
   C $\frac{9}{25}$
   D $\frac{12}{25}$

10. The values of x that satisfy the equation $3^{2x} - 10(3^x) + 9 = 0$ are

    A $x = 1$ or $x = 9$
    B $x = -2$ or $x = 0$
    C $x = -1$ or $x = -9$
    D $x = 0$ or $x = 2$

11. If $y = 0$ when $x = 2$, then the solution of the differential equation $y\frac{dy}{dx} = x$ is
    A $y^2 = x^2 + 2$
    B $y^2 = x^2 - 4$
    C $y^2 = x^2 - 2$
    D $y^2 = x^2 + 4$

12. On the set $A = \{2, 4, 8, 16, \}$, a relation R is defined by $x R y$ if and only if y is a multiple of x. R is
    A an equivalence relation
    B symmetric
    C transitive
    D Not reflexive

13. The line segment AB, where $A(5,5)$ and $B(3,-2)$ is the diameter of a circle. The equation of the circle is

A $(x-5)(x-3)+(y-5)(y-2)=0$
B $(x-5)(x+3)+(y-5)(y+2)=0$
C $(x-5)(x-3)+(y+5)(y+2)=0$
D $(x-5)(x-3)+(y-5)(y+2)=0$

14. Two vectors $\mathbf{a}$ and $\mathbf{b}$ are given as $\mathbf{a}=\mathbf{i}+3\mathbf{j}+2\mathbf{k}$ and $\mathbf{b}=2\mathbf{i}-\mathbf{j}+2\mathbf{k}$. The vector product $\mathbf{a}\times\mathbf{b}$ is

A $8\mathbf{i}+2\mathbf{j}-7\mathbf{k}$
B $8\mathbf{i}-2\mathbf{j}-7\mathbf{k}$
C $8\mathbf{i}-2\mathbf{j}+7\mathbf{k}$
D $8\mathbf{i}-6\mathbf{j}-7\mathbf{k}$

15. The volume generated when the area of the finite region enclosed by the x-axis and the curve $y=2x^2-4x$ is rotated completely about the x-axis is

A $\pi\displaystyle\int_0^{-2}(2x^2-4x)^2dx$

B $\pi\displaystyle\int_0^{2}(2x^2-4x)^2dx$

C $2\pi\displaystyle\int_{-2}^{2}(2x^2-4x)^2dx$

D $2\pi\displaystyle\int_{-2}^{0}(2x^2-4x)^2dx$

16. A root of the equation $x^3+x-26=0$, lies between

A   1 and 2
B   3 and 4
C   4 and 5
D   2 and 3

17. The sum of the first n terms of a sequence is given by $S_n=2n^2+n$. The nth term of this sequence is

A $4n+1$
B $4n-3$
C $4n-1$
D $4n+3$

18. The first three terms in the binomial expansion of $(1+3x)^{-1}$ are

A $1-3x+9x^2$
B $1+3x-9x^2$
C $1-3x-9x^2$
D $1+3x+9x^2$

19. The value of x for which $\log_2 2+\log_2(2x+5)=1$ is

A 2
B $-\dfrac{1}{2}$
C $\dfrac{1}{2}$
D -2

20.
$$\lim_{x\to2}\left(\frac{x-2}{x^2-5x+6}\right)=$$

A   0
B   -1
C ∞
D   1

21.
$$\int_0^1\frac{x}{1+x^2}dx=$$

A $\ln2$
B $\ln4$
C $\dfrac{1}{2}\ln2$
D $\dfrac{1}{2}\ln4$

22. If $y^3=12x-x^3$, then $\dfrac{dy}{dx}=$

A $\dfrac{x^2-4}{y^2}$

B $\dfrac{x^2+4}{y^2}$

C $\dfrac{4+x^2}{y^2}$

D $\dfrac{4-x^2}{y^2}$

Turn Over

23. The complex number

$$z = \frac{1 + 2i}{3 - 4i}$$

can be expressed in the form $a + bi$ as

A $\quad \frac{11}{25} + \frac{2}{5}i$

B $\quad -\frac{11}{25} + \frac{2}{5}i$

C $\quad -\frac{1}{5} - \frac{2}{5}i$

D $\quad -\frac{1}{5} + \frac{2}{5}i$

24. The argument of the complex number

$$z = \frac{1 + i\sqrt{3}}{1 + i} \quad \text{is}$$

A $\quad \frac{\pi}{4}$

B $\quad \frac{\pi}{12}$

C $\quad \frac{7\pi}{12}$

D $\quad -\frac{\pi}{12}$

25. The general solution of the equation

$$\sin\theta = \frac{\sqrt{3}}{2} \quad \text{is}$$

A $\quad n\pi - (-1)^n \frac{\pi}{3}$

B $\quad n\pi + (-1)^n \frac{\pi}{6}$

C $\quad n\pi + (-1)^n \frac{\pi}{3}$

D $\quad n\pi - (-1)^n \frac{\pi}{6}$

26. The tangent of the acute angle between the lines $y = 5x - 7$ and $y = x - 6$ is

A $\quad \frac{2}{3}$

B $\quad -\frac{2}{3}$

C $\quad -1$

D $\quad -\frac{3}{2}$

27. The values of y for various values of x are given in the table below.

x	1	2	3	4	5	6
y	2	3.2	4.2	5	5.7	6.3

Using the trapezium rule, $\int_1^6 y\,dx \approx$

A $\quad 22.25$

B $\quad 26.40$

C $\quad 22.52$

D $\quad 34.70$

28. The number of arrangements of the letters of the word SUCCEEDED is

A $\quad \frac{9!}{2!\,3!}$

B $\quad \frac{9!}{2!\,2!\,3!}$

C $\quad \frac{5!}{2!\,2!\,3!}$

D $\quad \frac{5!}{2!\,3!}$

29. The equations of the vertical asymptotes to the graph of $f(x) = \frac{8}{x^2 - 4}$ are

A $\quad x = 4, x = 8$

B $\quad x = -4, x = 8$

C $\quad x = 2, x = -2$

D $\quad x = 4, x = -8$

30. The solution set of the inequality $\frac{x + 2}{x - 1} \geq 0$ is

A $\quad \{x : -2 \leq x \leq -1\}$

B $\quad \{x : -2 \leq x < -1\}$

C $\quad \{x : x \leq -2 \cup x : x \geq 1\}$

D $\quad \{x : x \leq -2 \cup x : x > 1\}$

31. A committee of 5, with at least one boy and at least one girl, is to be formed from 3 boys and 5 girls. The number of ways this committee can be formed if there are to be more girls than boys is

A $\quad 45$

B $\quad 15$

C $\quad 30$

D $\quad 21$

Go on to the next page

32. The value of a for which the quadratic equation $ax^2 - 10x + 4 = 0$ has equal roots is

A $-\dfrac{25}{4}$

B $\dfrac{4}{25}$

C $-\dfrac{4}{25}$

D $\dfrac{25}{4}$

33. A linear reduction of the relationship $y = ax^{n-1}$ produced the result $\log y = 4\log x + 2$. The values of the constants $\log a$ and n are

A $\log a = 2, n = 5$
B $\log a = 1, n = 5$
C $\log a = 2, n = 3$
D $\log a = 1, n = 4$

34. The cardinality of the set $X = \{a, b, c\}$ is
A 9
B 8
C 6
D 3

35. The Cartesian equation of the curve with parametric equations $x = 1 - t^2$ and $y = 4t$, where t is a parameter is

A $4x = 4 + y^2$
B $4x = 4 - y^2$
C $16x = 16 - y^2$
D $16x = 16 + y^2$

SECTION B: STATISTICS

36. Given that $P(A/B) = \dfrac{7}{10}$ and $P(A \cap B) = \dfrac{1}{10}$, $P(B) =$

A $\dfrac{1}{7}$

B $\dfrac{4}{5}$,

C $\dfrac{3}{5}$

D $\dfrac{7}{100}$

37. A discrete random variable X takes values 1, 2 and 3 with probabilities 0.2, 0.3 and 0.5 respectively. The mean of X is

A 0.03
B 5.9
C 1.0
D 2.3

38. If a random variable X is such that $Var(X) = 4$, then $Var(3X - 2) =$
A 34
B 36
C 12
D 10

39. Given that the regression lines y on x and x on y are $y = 6x - 5$ and $x = 0.3y + 1$ respectively, the product moment correlation coefficient between the variables x and y is

A 1.8
B -1.8
C 1.34
D -1.34

40. A random variable X follows a Poisson distribution with parameter λ. If $P(X = 0) = 3P(X = 1)$ then the value of λ is
A 3
B $\dfrac{1}{3}$
C 4
D $\dfrac{1}{4}$

41. To start a board game, a die is rolled repeatedly until a 6 is obtained. The random variable : "*the number of rolls made until a 6 is obtained*" can best be modeled using

A a binomial distribution
B a geometric distribution
C a Poisson distribution
D a uniform distribution

42. If a random variable $X \sim Bin\left(12, \dfrac{1}{3}\right)$, then $E(2X - 3) =$
A 5
B 8
C 11
D 21

Turn Over

43. Given that X is a continuous random variable with probability density function f , defined by
$$f(x) = \begin{cases} 6x - 6x^2, & 0 \le x \le 1 \\ 0, & \text{otherwise.} \end{cases}$$
The mode of X is

  A $\dfrac{5}{12}$

  B 1

  C 0

  D $\dfrac{1}{2}$

44. If events A and B are mutually exclusive with $P(A) = \frac{2}{10}$ and $P(B) = \frac{1}{2}$ then $P(A' \cap B') =$

  A $\dfrac{7}{20}$

  B $\dfrac{3}{20}$

  C $\dfrac{7}{10}$

  D $\dfrac{3}{10}$

45. A set of bivariate data has the following summary statistics.
$n = 10, \sum x = 16, \sum y = 38, \sum xy = 119$
The covariance of X and Y for this data is

  A 17.98

  B 179.8

  C 5.82

  D 58.2

46. A continuous random variable X has probability density function f defined by
$f(x) = 3e^{-3x}, x > 0$
The expectation of this exponential probability distribution is

  A 3

  B $\dfrac{1}{3}$

  C 6

  D $\dfrac{1}{6}$

47. If A and B are two independent events with $P(A) = \frac{3}{4}$ and $P(B) = \frac{1}{3}$, then $P(A \cap B') =$

  A $\dfrac{1}{2}$

  B $\dfrac{1}{4}$

  C $\dfrac{1}{12}$

  D $\dfrac{1}{3}$

48. The rankings assigned by two judges to 5 contestants were such that $\sum d^2 = 4$ .The Spearman's rank correlation coefficient for these rankings is

  A $\dfrac{4}{5}$

  B $\dfrac{2}{5}$

  C $\dfrac{1}{5}$

  D $\dfrac{3}{5}$

49. A random variable X follows a normal distribution with mean 28 and variance 4.
$P(25 < X < 34) =$

  A $\phi(3) - \phi(1.5)$

  B $\phi(3) + \phi(1.5) - 1$

  C $\phi(3) + \phi(1.5)$

  D $\phi(3) - \phi(1.5) - 1$

50. A year ago 54% of the customers of a certain restaurant rated the services as excellent. Some weeks later, the proprietor employed a more experienced management with the belief that the customers' rating will step up. After some time, he decides to carry out a hypothesis test to cross check his belief. The null and alternative hypothesis he should use for this test are

  A $H_0: p = 0.54$ and $H_1: p < 0.54$

  B $H_0: p = 0.54$ and $H_1: p > 0.54$

  C $H_0: p = 0.54$ and $H_1: p = 0.54$

  D $H_0: p = 0.54$ and $H_1: p \ne 0.54$

STOP
GO BACK AND CHECK YOUR WORK