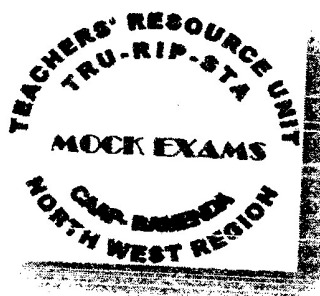


REPUBLIQUE DU CAMEROUN
Paix-Travail-Patrie

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MARCH 2024

The Teachers' Resource Unit and the Regional Inspectorate of Pedagogy, in collaboration with MTA		SUBJECT CODE NUMBER 0770	PAPER NUMBER 1
GENERAL CERTIFICATE OF EDUCATION REGIONAL MOCK EXAMINATION			
CANDIDATE NAME:		SUBJECT TITLE PURE MATHEMATICS WITH STATISTICS	
CANDIDATE NUMBER:			
CENTRE NUMBER:			
ADVANCED LEVEL			

Time Allowed: One and a half hours
INSTRUCTIONS TO CANDIDATES:

Mobile phones are NOT ALLOWED in the examination room.

- USE A SOFT HB PENCIL THROUGHOUT THIS EXAMINATION.
- DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Before the Examination begins:

- Check that this question booklet is headed "Advanced level -0770 code and subject title PURE MATHEMATICS WITH STATISTICS G Paper 1".
- Insert the information required in the spaces above.
- Without opening the booklet, pull out the answer sheet carefully from inside the front cover of this booklet. 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.
- Insert the information required in the spaces provided on the answer sheet using your HB pencil:

Candidate Name, Centre Number, Candidate Number, Subject Code Number, and Paper number

How to answer questions in this examination:

- Answer ALL the 50 questions in this examination. All questions carry equal marks.
 - Non-programmable calculators are allowed.
 - For each question there are four suggested answers, A, B, C and D. Decide 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] [C] [D]
- Mark only one answer for each question. If you mark more than one answer, you will score zero for that question. If you change your mind about an answer, erase the first mark carefully, and then mark your new answer.
 - Avoid spending much time on any question. If you find a question difficult, move to the next question. You can come back to this question later.
 - Do all rough work in this booklet using, where necessary, the blank space at the back of the booklet.
 - You must not take this booklet and answer sheet out of the examination room. All question booklets and answer sheets will be collected at the end of the examination.



SECTION A: PURE MATHEMATICS

1. The equation $3x^2 - x + 2 = 0$ has:

- A Real roots
- B Equal roots
- C Complex roots
- D Real and distinct roots

2. If the roots of the equation $2x^2 - 4x + 5 = 0$ are α and β , then the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ is:

- A $-\frac{4}{25}$
- B $\frac{-2}{5}$
- C $\frac{4}{25}$
- D $\frac{5}{2}$

3. $\frac{x+3}{(x-1)(x^2+1)}$ can be expressed into partial fractions in the form:

- A $\frac{A}{x-1} + \frac{B}{x^2+1}$
- B $\frac{Ax+B}{x-1} + \frac{Cx+D}{x^2+1}$
- C $\frac{A}{x-1} + \frac{B}{x+1} + \frac{C}{x^2+1}$
- D $\frac{A}{x-1} + \frac{Bx+C}{x^2+1}$

4. The range of values of x for which $\frac{3}{4-x} > 2$ is:

- A $\frac{5}{2} \leq x \leq 4$
- B $\frac{5}{2} < x < 4$
- C $x < \frac{5}{2}$ or $x > 4$
- D $x \leq \frac{5}{2}$ or $x \geq 4$

5. Given that

$p(x) = (2x-1)(x-3)(ax+6) + 12x - 8$ is exactly divisible by $(x-1)$, the value of a is:

- A 1
- B -1
- C $\frac{1}{2}$
- D -4

6. The sum of the first n terms of a series is $S_n = 3n^2 - n$. The n^{th} term of the series is:

- A $6n - 4$
- B $7n + 4$
- C $-6n + 4$
- D $2n - 3$

7. The 6th term of a geometric progression is 16 and the 3rd term is 2. First term and the common ratio are respectively:

- A 1 and 3
- B $\frac{3}{2}$ and 2
- C $\frac{1}{2}$ and 2
- D $\frac{1}{2}$ and 3

8. The contrapositive of $p \Rightarrow q$ is:

- A $q \Rightarrow p$
- B $\sim q \Rightarrow \sim p$
- C $\sim p \Rightarrow \sim q$
- D $\sim p \Rightarrow q$

9. A statement which is logically equivalent to $\sim(p \Rightarrow q)$ is:

- A $p \Rightarrow \sim q$
- B $\sim p \Rightarrow q$
- C $\sim p \Rightarrow \sim q$
- D $\sim q \Rightarrow \sim p$

10. The largest coefficient in the expansion of $(1+x)^{10}$ is:

- A $\frac{10!}{(5!)^2}$
- B $\frac{10!}{5!}$
- C $\frac{10!}{(5!4!)^2}$
- D $\frac{10!}{5!4!}$

11. The term independent of x in the expansion of:

$$\left(2x + \frac{1}{x^2}\right)^6$$

- A -240
- B 16
- C 15
- D 240

12. Given that $A(1, 3)$, $B(5, 7)$, $C(4, 8)$ and $D(0, a)$ form a rectangle ABCD, the value of a is:

- A -4
- B 4
- C 3
- D -1

13. Given that the image of $A(3, -3)$ in the line $2y = x + 1$ is $B(a, 5)$, the value of a is:

- A 1
- B 3
- C -1
- D -3

14. A partial ordered relation is

- A reflexive, symmetric and transitive
- B reflexive, anti-symmetric and transitive
- C an equivalence relation
- D reflexive, symmetric and anti-symmetric

15. Given that $A = \{1, 2, 3, 4, 5, 6, 7\}$ and R is the relation on A such that xRy if and only if $x + y$ is even for all $x, y \in A$.

The equivalence class of 1 is:

- A $\{1, 3, 5, 7\}$
- B $\{2, 3, 4, 6, 7\}$
- C $\{3, 5, 7\}$
- D $\{2, 4, 6\}$

16. The function f is defined by $f(x) = \frac{x+3}{x-1}$, $x \neq 1$.

$$f(f(x)) =$$

- A $\frac{x-1}{x+3}$
- B $\frac{x+3}{x^2+6x+9}$
- C x
- D 1

17. The function $g(x) = \begin{cases} 2x-1, & 0 \leq x < 1 \\ 1, & 1 \leq x < 2 \end{cases}$ is periodic with period 5. $g(5.5) =$

- A 11
- B 10
- C 1
- D 0



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18. The argument of $z = -3 - 3i$ is:

- A $\frac{\pi}{4}$ C $-\frac{\pi}{4}$
B $-\frac{3\pi}{4}$ D $\frac{3\pi}{4}$

19. $\left| \frac{2+2i}{-1+\sqrt{3}i} \right| =$

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

20. $\lim_{n \rightarrow \infty} \left(\frac{3n^3 + 2n + 6}{n^5 + 2n^2 + 9} \right) =$

- A 3 C 0
B ∞ D $\frac{1}{3}$

21. If $y = \sin^3 x$, then $\frac{dy}{dx} =$

- A $3 \sin^2 x$ C $\cos^3 x$
B $3 \sin x \cos x$ D $3 \sin^2 x \cos x$

22. The vertical asymptote(s) of the graph of $y = \frac{-2x^2 - 1}{x^2 - 1}$ is(are):

- A $x = 1$ and $x = -1$ C $x = 1$
B $x = 2$ and $x = -2$ D $x = \frac{1}{2}$

23. $\int x^2 e^{x^3} dx =$

- A $e^{x^3} + C$ C $\frac{1}{3} e^{x^3} + C$
B $2x e^{3x^2} + C$ D $\frac{1}{2} e^{x^3} + C$

24. The general solution of the differential equation

$(x - 1) \frac{dy}{dx} = x$, where A is a constant, is

- A $y = x + \ln|x - 1| + A$
B $y = x - 1 + \ln|x| + A$
C $y = \frac{x}{x - 1} + A$
D $y = \ln|x - 1| + A$

25. Two variables x and y are connected by the equation $y = ab^x$. A linear equivalence of this equation is:

- A $\ln y = x \ln(ab)$
B $\ln y = x \ln a + \ln b$
C $\ln y = \ln a + b \ln x$
D $\ln y = x \ln b + \ln a$

26. The equations of the asymptotes to the curve $y = \frac{3x^2 - 7}{x^2 + x - 2}$ are:

- A $x = -1, x = 2, y = -3$
B $x = -2, x = 1, y = 3$
C $x = 2, x = -1, y = -3$
D $x = -2, x = -1, y = 3$



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27. The values of α and β for which the lines

$r = 3i - j + k + \alpha(i + 2j - k)$ and
 $r = 4i + 4j + k + \beta(-i + j + 2k)$ Intersect are:

- A $\alpha = 2$ and $\beta = 1$
B $\alpha = 2$ and $\beta = -1$
C $\alpha = -2$ and $\beta = -1$
D $\alpha = -2$ and $\beta = 1$

28. The value of x for which $e^{\ln x} + \ln e^x = 8$ is:

- A -2 C 4
B 2 D -4

29. $\sum_{r=101}^{200} r =$

- A 99 C 5050
B 100 D 15050

30. A school council commission of 6 members is to be formed from 10 men and 7 women. The number of ways in which this can be done if the commission is to include at least 4 men and 1 woman is:

- A 6174 C 1764
B 4410 D 41

31. The length of the tangent from the point (5, 6) to the circle $x^2 + y^2 + 2x + 4y - 21 = 0$ is:

- A 74 C $\sqrt{74}$
B 10 D $\sqrt{26}$

32. $\frac{\cos 3x - \cos x}{\sin 3x - \sin x} =$

- A $\tan 2x$ C $\cot 2x$
B $-\tan 2x$ D $-\cot 2x$

33. The first approximation to the root of the equation $x^2 = 5$ is $x = 2$. Using the Newton-Raphson method, a second approximation to the root of the equation is:

- A 4 C $\frac{4}{9}$
B -1 D $\frac{9}{4}$

34. If $A = \begin{pmatrix} 1 & 2 & x \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & -2 & y \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ and $AB = I_3$,

then $x + y =$

- A 0 C 2
B -1 D 1

35. The period of the function $p(x) = \cos\left(\frac{2x}{3}\right)$ is:

- A $\frac{4\pi}{3}$ C 3π
B $\frac{2\pi}{3}$ D 2π

SECTION B: STATISTICS

36. A fair die is thrown twice. The probability that neither throw results in a 6 is:

- A $\frac{25}{36}$ C $\frac{1}{3}$
B $\frac{5}{6}$ D $\frac{11}{36}$

37. The mean of 8 numbers is 38.9. If the ninth number is now included the mean becomes 39. The value of the ninth number is:

- A 39.8
B 39.7
C 38.9
D 39.0

38. An example of a continuous random variable is.

- A Number of errors made by a typist
B Number of cars passing a road junction
C Number of rods produced in a factory
D Length of bolts produced in a factory

39. A set of values of a random variable X has variance 4. The variance of Y where $Y = 2X + 1$ is:

- A 4 C 16
B 8 D 17

40. The mean age of 23 boys is 13 years and the mean age of 37 girls of a class is 12 years. The mean age of the 60 students is:

- A 12.2 years C 12.4 years
B 12.3 years D 12.5 years

41. The weight of an egg from a poultry is normally distributed with mean 50g and standard deviation 5g. A random sample of 16 eggs is chosen. The limits within which the central 95% of the mean of such a sample will lie is:

- A $(50 \pm 2.45)g$
B $(50 \pm 2.46)g$
C $(50 \pm 1.25)g$
D $(50 \pm 0.61)g$

42. A sample of size 10 drawn from a population is such that $\sum x = 60$ and $\sum x^2 = 450$. An unbiased estimate of the population variance is:

- A 6 C 9
B 10 D 45

43. Given that X is a Poisson variable with mean 2, the value of $P(X = 2)$ is:

- A e^2 C $2e^2$
B e^{-2} D $2e^{-2}$

44. The random variable X is such that $X \sim B\left(72, \frac{1}{3}\right)$.

Using the normal approximation to the binomial distribution, $P(X \leq 28) =$

- A $P(z < 1)$ C $P(z < 0.875)$
B $P(z < 2.25)$ D $P(z < 1.125)$

45. The random variable X has probability mass function p defined by

$$p(x) = \begin{cases} 0.1(5-x), & x = 1, 2, 3, 4 \\ 0, & \text{elsewhere} \end{cases}$$

$$P(1 \leq X < 3) =$$

- A 0.6 C 0.2
B 0.3 D 0.5

46. The probability density function of a random variable Y is defined by

$$f(y) = \begin{cases} ay^2, & 0 \leq y \leq 3 \\ 0, & \text{elsewhere} \end{cases}$$

The value of the constant a is:

- A $\frac{2}{27}$ C $\frac{1}{9}$
B $\frac{1}{27}$ D $\frac{2}{9}$

47. In hypothesis testing a Type II error is committed if:

- A a true null hypothesis is rejected
B a true null hypothesis is accepted
C a false null hypothesis is accepted
D a true null hypothesis is rejected

48. For a set of bivariate data (x, y) , $n = 7$, $\sum x = 38$, $\sum y = 89$, and $\sum xy = 495$. The value of $\text{Cov}(x, y)$ is:

- A 1.700 C 1.693
B 1.694 D 1.690

49. Two judges rank 8 competitors so that the sum of the squares of the differences in their ranking is 38. The Spearman's coefficient of rank correlation for the rankings is:

- A 0.55 C 0.45
B 0.54 D 0.92

50. For a given set of data, the equations of the least squares regression lines y on x and x on y are $y = 0.219x + 20.8$ and $x = 0.785y + 16.2$. The product moment correlation coefficient for the data is:

- A 0.415 C 0.566
B 0.172 D 0.279



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