0770/1/2022
MATH A/L

SOUTH WEST REGIONAL MOCK EXAMINATION
GENERAL EDUCATION

The Teachers' Resource Unit (TRU) in collaboration with the Regional Pedagogic Inspectorates and the Subject Teachers' Association (STA)	Subject Code **0770**	Paper Number **1**
CANDIDATE NAME ………………………………………… CANDIDATE NUMBER ………………………………………… CENTRE NUMBER …………………………………………	Subject Title **Mathematics with Statistics**	
ORDINARY LEVEL	DATE **05/04/2022**	

Mobile phones are **NOT** allowed in the examination room.

MULTIPLE CHOICE QUESTION PAPER

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 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 Name, Exam Session, Subject Code, Centre Number and Candidate Number.** 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 instruction.
6. *Answer All questions.*
7. **Mathematical tables (Formulae booklets) and calculators are allowed.**
8. Each question has FOUR suggested answers: **A, B, C** and **D.** Decide which answer is appropriate. 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]
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 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. DO NOT ATTEMPT TO LEAVE THE EXAMINATION HALL WITH IT.**

SECTION A: PURE MATHEMATICS

1. The binomial expansion of $(5-3x)^{\frac{1}{2}}$ is valid when

A	$-\frac{1}{5} < x < \frac{1}{5}$
B	$-\frac{3}{5} < x < \frac{3}{5}$
C	$\frac{4}{3} \le x < \frac{4}{3}$
D	$-\frac{1}{3} < x < \frac{1}{3}$

2. If $x^2 - 6x + 4 \equiv (x+A)^2 + B$, then

A	$A = 3$ and $B = -5$
B	$A = -3$ and $B = -5$
C	$A = -3$ and $B = 5$
D	$A = 3$ and $B = 5$

3. If $\frac{7x-1}{(x+2)(x-3)} \equiv \frac{A}{x+2} + \frac{B}{x-3}$, then

A	$A = 3$ and $B = -4$
B	$A = 4$ and $B = 3$
C	$A = 3$ and $B = 4$
D	$A = -3$ and $B = 4$

4. The value of x for which $\log(x^2-3) - \log x = \log 2$ is

A	1
B	3
C	-3
D	-1

5. If the n^{th} term of the geometric progression $243, 81, 27\ldots$ is $\frac{1}{9}$, then the value of n is?

A	10
B	8
C	9
D	11

6. The vector equation of the line that passes through the points (2, -1, 4) and (3, 2, 7) is

A	$2\mathbf{i} - \mathbf{j} + 4\mathbf{k} + \mu(3\mathbf{i} + 2\mathbf{j} + 7\mathbf{k})$
B	$2\mathbf{i} - \mathbf{j} + 4\mathbf{k} + \mu(5\mathbf{i} + \mathbf{j} + 11\mathbf{k})$
C	$2\mathbf{i} - \mathbf{j} + 4\mathbf{k} + \mu(-\mathbf{i} - 3\mathbf{j} + 3\mathbf{k})$
D	$2\mathbf{i} - \mathbf{j} + 4\mathbf{k} + \mu(\mathbf{i} + 3\mathbf{j} + 3\mathbf{k})$

7. The period of the trigonometric function $y = 2\sin 4x$ is

A	π
B	$\frac{\pi}{4}$
C	$\frac{\pi}{2}$
D	$\frac{\pi}{8}$

8. If the complex number z is such that $\frac{z(1-2i)}{3i} = 1$, then $z = a + bi$.

A	$a = \frac{6}{5}$ and $b = \frac{3}{5}$
B	$a = -\frac{6}{5}$ and $b = \frac{3}{5}$
C	$a = \frac{6}{5}$ and $b = -\frac{3}{5}$
D	$a = -\frac{6}{5}$ and $b = -\frac{3}{5}$

9. The polynomial $3x^3 - 2ax^2 + ax - 5$ leaves a remainder of 1 when divided by $x - 2$. The value of the real constant a is

A	-3
B	3
C	1
D	-2

10. An equivalence relation is

A	Reflexive, Symmetric and non-transitive
B	Reflexive, anti-symmetric and Transitive
C	Reflexive, Symmetric and Transitive
D	Reflexive, anti-symmetric and non-transitive

11. If $x^2 - y^2 + xy = 5$, then $\frac{dy}{dx} =$

A	$\frac{2x-y}{2y-x}$
B	$\frac{2x+y}{2y+x}$
C	$\frac{2x-y}{2y+x}$
D	$\frac{2x+y}{2y-x}$

12. The number of ways in which the letters of the word **PROFESSIONALISM** can be arranged are

A	$\frac{15!}{2!3!2!}$
B	$\frac{15!}{2!2!2!}$
C	$\frac{15!}{3!2!3!}$
D	$\frac{15!}{3!3!3!}$

13. The asymptotes of the curve of the function $y = \frac{2x}{x^2+2x-3}$ are

A	$y = 2, x = 3$ and $x = 1$
B	$y = 2, x = -3$ and $x = 1$
C	$y = 0, x = -3$ and $x = 1$
D	$y = 0, x = 3$ and $x = 1$

14. The coordinates of the centre of the circle $x^2 + y^2 - 4x + 6y + 5 = 0$ are

A	$(-2, -3)$
B	$(2, -3)$
C	$(2, 3)$
D	$(-2, 3)$

15. To find the integral of $\frac{1}{\sqrt{9 - x^2}}$, with respect to x, a suitable substitution to use is

A	$x = 3\sin\theta$
B	$x = 9\sin\theta$
C	$x^2 = 9\sin\theta$
D	$x^2 = 3\sin\theta$

16. The tangent of the acute angle between the lines $2x - y + 1 = 0$ and $x - 2y + 3 = 0$ is

A	$\frac{2}{3}$
B	$\frac{1}{4}$
C	$\frac{1}{3}$
D	$\frac{3}{4}$

17. If $(x - 1)(x - 2)(3 - x) < 0$, then

A	$x < 1,\ 2 < x < 3$
B	$1 < x < 2,\ x > 3$
C	$x < 2, x > 3$
D	$x < 1, x > 3$

18. The table below shows some values of a continuous variable x and their corresponding y values on the curve $y = f(x)$.

x	1	3	5	7
y	$\frac{1}{2}a$	b	$2b$	a

An approximate value of the area of the region between the curve $y = f(x)$, ordinates $x = 1$, $x = 7$ and the x – axis is

A	$\frac{3}{4}a + 3b$
B	$\frac{3}{2}a + 6b$
C	$\frac{1}{2}a + 2b$
D	

19. $(\sin\theta + \cos\theta)^2 \equiv$

A	$1 + \frac{1}{2}\sin 2\theta$
B	$1 + 2\sin 2\theta$
C	$1 + 2\sin^2\theta$
D	$1 + \sin 2\theta$

20. If the roots of the quadratic equation $4x^2 - (k - 5)x + 1 = 0$ are equal, then the possible values of k are

A	1, 9
B	-4, 4
C	-1, 9
D	4, 5

21. A function $f(x)$ is defined as $f(x) = \frac{2x - 3}{5 - x}$, $x \in \mathbb{R}, x \neq 5$. The range of $f(x)$ is

A	$x \in \mathbb{R},\ x \neq -\frac{3}{5}$
B	$x \in \mathbb{R},\ x \neq \frac{3}{5}$
C	$x \in \mathbb{R},\ x \neq -3$
D	$x \in \mathbb{R},\ x \neq -2$

22. If $k + 3$, $2k + 5$ and 8 are three consecutive terms of an arithmetic sequence, then the value of k is

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

23. p and q are two statements defined by
p: Comfort is awake
q: Comfort is reading
The best linguistic equivalence of $\sim(p \wedge q)$ is

A	Comfort is awake and reading
B	Comfort is awake and not reading
C	Comfort is not awake and she is not reading
D	Comfort is not awake or she is not reading

24. $\frac{\sin 5\theta - \sin\theta}{\sin 4\theta - \sin 2\theta} \equiv$

A	$2\sin\theta$
B	$2\sec\theta$
C	$2\cos\theta$
D	$2\csc\theta$

25. The determinant of the 3 x 3 matrix **M**, where $\mathbf{M} = \begin{pmatrix} 1 & 3 & 2 \\ 1 & 2 & 1 \\ 2 & 4 & 3 \end{pmatrix}$ is

A	2
B	-3
C	1
D	-1

26. $\lim_{x \to \infty} \left(\frac{2x^2 - 1}{3 + 4x^2} \right) =$

A	$\frac{1}{2}$
B	$\frac{2}{3}$
C	1
D	0

27. The general solution of the differential equation $\frac{dy}{dx} = \frac{y}{x+1}$ is

A	$y = (x+1) + A$
B	$y = A(x+1)$
C	$y = Ae^{x+1}$
D	$y = e^{x+1} + A$

28. A(1, 3) and B(-5, -13) are two points in the *xy* plane. If PA = PB, then the coordinates of P(*x*, *y*) are

A	(-5, -2)
B	(-4, -10)
C	(-10, -2)
D	(-2, -5)

29. If $f(x) = 2x - 3$ and $g(x) = \frac{5}{x}$, then $fg(x) =$

A	$\frac{5}{2x-3}$
B	$\frac{10-x}{x}$
C	$\frac{10-3x}{x}$
D	$\frac{5-3x}{x}$

30. If the radius of a sphere is increasing at 2 cm/s, then when the radius is 3 cm, its volume will be increasing at

A	$36\pi\ cm^3/s$
B	$72\pi\ cm^3/s$
C	$6\pi\ cm^3/s$
D	$18\pi\ cm^3/s$

31. If $x = 3$ is a first approximate root of the equation $x^2 - 3x + 1 = 0$, then a second approximate root of this equation is

A	$\frac{10}{3}$
B	$\frac{11}{3}$
C	$\frac{7}{3}$
D	$\frac{8}{3}$

32. $\int 6 \cos x \sin^2 x\, dx =$

A	$2\sin^3 x + K$
B	$3\sin^3 x + K$
C	$6\sin^3 x + K$
D	$\sin^3 x + K$

33. If $z = 2\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right)$, then $z^6 =$

A	$32i$
B	32
C	$-32i$
D	-32

34. The midpoint of A(1, 1) and B(3, 5) is the centre of a circle. The equation of this circle is

A	$x^2 + y^2 + 4x - 6y + 8 = 0$
B	$x^2 + y^2 - 4x + 6y + 8 = 0$
C	$x^2 + y^2 - 4x - 6y + 8 = 0$
D	$x^2 + y^2 + 4x + 6y + 8 = 0$

35. The Cartesian equation of a line is $\frac{x+4}{4} = \frac{y-2}{3} = z + 3$. The vector equation of this line is

A	$\mathbf{r} = 4\mathbf{i} + 2\mathbf{j} + 3\mathbf{k} + \mu(4\mathbf{i} + 3\mathbf{j} + \mathbf{k})$
B	$\mathbf{r} = -4\mathbf{i} + 2\mathbf{j} - 3\mathbf{k} + \mu(4\mathbf{i} + 3\mathbf{j} + \mathbf{k})$
C	$\mathbf{r} = -4\mathbf{i} + 2\mathbf{j} + 3\mathbf{k} + \mu(4\mathbf{i} + 3\mathbf{j} + \mathbf{k})$
D	$\mathbf{r} = -4\mathbf{i} + 2\mathbf{j} - 3\mathbf{k} + \mu(4\mathbf{i} + 3\mathbf{j} - \mathbf{k})$

SECTION B: STATISTICS

36. Two events A and B are such that $(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{8}$. $P[(A \cup B)'] =$

A	$\frac{5}{8}$
B	$\frac{3}{8}$
C	$\frac{7}{8}$
D	$\frac{1}{2}$

37. If random variable $X \sim B\left(10, \frac{1}{5}\right)$, then $P(X > 0) =$

A	$\left(\frac{1}{5}\right)^{10}$
B	$1 - \left(\frac{1}{5}\right)^{10}$
C	$\left(\frac{4}{5}\right)^{10}$
D	$1 - \left(\frac{4}{5}\right)^{10}$

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38. In any distribution, the approximate relationship between the mean, median and mode is

A	mean – median = 3(mean – mode)
B	mean – mode = 3(median – mean)
C	mean – mode = 3(mean – median)
D	mean – median = 3(mode – mean)

39. If the mean and variance of set $A = \{1, 2, 3, 4, 5, 6, 7\}$ are 4 and 4 respectively, then the mean and variance of set $B = \{13, 23, 33, 43, 53, 63, 73\}$ are

A	43 and 400
B	40 and 400
C	40 and 40
D	43 and 40

40. The table below gives data from two sets.

	n	$\bar{x}$
Set 1	12	6
Set 2	8	10

When the two sets are combined, the mean will be

A	6.7
B	7.2
C	7.6
D	6.4

41. A discrete random variable X can take the values 10 and 20 only. If $E(X) = 16$, then

A	$P(X = 10) = \frac{2}{5}$ and $P(X = 20) = \frac{3}{5}$
B	$P(X = 10) = \frac{3}{5}$ and $P(X = 20) = \frac{2}{5}$
C	$P(X = 10) = \frac{1}{4}$ and $P(X = 20) = \frac{3}{4}$
D	$P(X = 10) = \frac{3}{4}$ and $P(X = 20) = \frac{1}{4}$

42. The probability density function of a continuous random variable X is given by $f(x) = a(x - 1), 0 < x < 4$. The value of the constant a is

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

43. The median m, of a continuous random variable X with probability density function $f(x) = x - \frac{9}{2}$, $5 < x < 6$, satisfies the equation

A	$m^2 - 9m + 20 = 0$
B	$m^2 - 9m + 19 = 0$
C	$m^2 - 8m + 20 = 0$
D	$m^2 - 8m + 19 = 0$

44. The probability distribution of a random variable is shown in the table below.

x	2	3	4
$P(x)$	p	p	$1 - 2p$

The mean of this distribution is

A	$4 - 2p$
B	$3 - 4p$
C	$1 - 3p$
D	$4 - 3p$

45. Independent random variables X and Y are such that $X \sim N(3, 1)$ and $Y \sim N(7, 5)$. If random variable W is defined by $W = Y - 2X$, then

A	$W \sim N(2, 9)$
B	$W \sim N(1, 1)$
C	$W \sim N(1, 8)$
D	$W \sim N(1, 9)$

46. Five brands of wine are ranked according to their tastes by two wine tasters as shown below.

2	1	4	3	5
3	1	5	2	4

The Spearman's rank correlation coefficient between the tasters is

A	$\frac{3}{5}$
B	$\frac{2}{5}$
C	$\frac{4}{5}$
D	$\frac{1}{5}$

47. Random variable $X \sim B(500, 0.002)$. Using Poisson approximation, $P(X = 2) =$

A	0.186
B	0.185
C	0.184
D	0.183

48. Random variable $X \sim N(100, 36)$. If $P(X < a) = 0.8925$, then $a =$

A	104.77
B	108.77
C	107.44
D	106.44

5|6

Turn Over

49. In conducting a hypothesis test, a general procedure is involved. Which one of the steps below is not a too necessary part of the general procedure?

A	State the null and alternative hypotheses
B	Calculate the value of the test statistic
C	Sketch the graph of the distribution involved
D	Determine the acceptance and rejection regions

50. If X is a random variable, then

A	$X \sim \mathrm{B}(n, p)$: $E(X) = np$ and $Var(X) = npq^2$
B	$X \sim \mathrm{Geo}(p)$: $E(X) = \frac{1}{p}$ and $Var(X) = \frac{q}{p}$
C	$X \sim \mathrm{P_o}(\lambda)$: $E(X) = \mu$ and $Var(X) = \lambda^2$
D	$X \sim \mathrm{Ex}(\lambda)$: $E(X) = \frac{1}{\lambda}$ and $Var(X) = \frac{1}{\lambda^2}$

STOP

GO BACK AND CHECK YOUR WORK