Edukamer

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD
General Certificate of Education Examination

0775 Further Mathematics 1

JUNE 2018 ADVANCED LEVEL

Centre Number	
Centre Name	
Candidate Identification Number	
Candidate Name	

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" – 0775 - **Further Mathematics 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 and Candidate Identification 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 instructions.

How to answer the questions in this examination

6. Answer **ALL** the **50** questions in this Examination. All questions carry equal marks.
7. Noiseless, non-programmable electronic 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 bracket 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 and then the question booklet. DO NOT ATTEMPT TO LEAVE THE EXAMINATION HALL WITH THEM.**

1. Which one of the following is the eccentricity of a hyperbola?

A 0

B 1

C $\sqrt{2}$

D $\frac{1}{2}$

---

2. The function $f(x) = \dfrac{(x+3)(x+1)}{(x+3)(x-1)(x+2)}$ has a removable discontinuity at $x=$

A -3

B -2

C -1

D 1

---

3. If $\sinh x = 3$, then x is

A $\ln(3-\sqrt{8})$

B $\ln(3+\sqrt{8})$

C $\ln(3+\sqrt{10})$

D $\ln(-3+\sqrt{10})$

---

4. The series $\sum u_n$ is convergent if

A $\lim\limits_{n\to\infty}\left|\dfrac{u_n}{u_{n+1}}\right| < 1$

B $\lim\limits_{n\to\infty}\left|\dfrac{u_{n+1}}{u_n}\right| > 1$

C $\lim\limits_{n\to\infty}\left|\dfrac{u_{n+1}}{u_n}\right| < 1$

D $\lim\limits_{n\to\infty}(u_n) = 0$

---

5. If $z = \cos\frac{\pi}{6} + i\sin\frac{\pi}{6}$, then $\left|z - \frac{1}{z}\right| =$,

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

B $2\sqrt{3}$

C $\sqrt{3}$

D 1

---

6. $\dfrac{x}{(x^2-1)(x+1)}$ can be expressed in partial fractions, where P, Q, and R are constants, as

A $\dfrac{P}{x-1} + \dfrac{Q}{x+1} + \dfrac{R}{(x+1)^2}$

B $\dfrac{Px+Q}{x^2-1} + \dfrac{R}{x+1}$

C $\dfrac{P}{(x-1)} + \dfrac{Q}{(x-1)^2} + \dfrac{R}{x+1}$

D $\dfrac{P}{x-1} + \dfrac{Q}{x+1} + \dfrac{Rx}{(x+1)^2}$

---

7. $\int \dfrac{x}{\sqrt{x^2+4}}dx =$

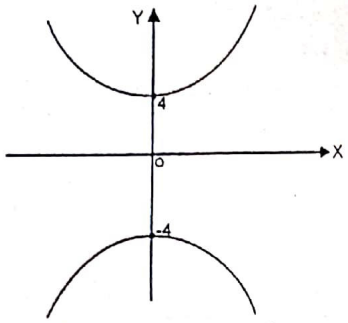
A $\dfrac{1}{\sqrt{x^2+4}} + k$

B $\frac{1}{2}\ln(x^2+4) + k$

C $\sqrt{x^2+4} + k$

D $\frac{1}{4}\ln(x^2+4) + k$

8.



The sketch above could be the graph of

A $\frac{x^2}{16} - \frac{y^2}{4} = 1$

B $\frac{y^2}{16} - \frac{x^2}{4} = 1$

C $\frac{y^2}{4} - \frac{x^2}{2} = 1$

D $\frac{x^2}{4} - \frac{y^2}{2} = 1$

---

9. The integrating factor for $x\frac{dy}{dx} + 2y = x^2$ is

A $2x$

B x

C x^2

D $2\ln x$

---

10. The root mean square value of $\tanh x$, for $2 \leq x \leq 4$, is

A $\left[\frac{1}{2}\int_2^4 \tanh^2 x dx\right]^{\frac{1}{2}}$

B $\left[\frac{1}{2}\int_2^4 \tanh^2 x dx\right]$

C $\left[\frac{1}{2}\int_2^4 \tanh x dx\right]^{\frac{1}{2}}$

D $\frac{1}{2}\int_2^4 \tanh x dx$

11. P and Q are statements such that

$P : (x-1)(x+3) < 0$

$Q : x < -3$

Which one of the following is true?

A $Q \Rightarrow P$

B $P \Rightarrow Q$

C $P \Rightarrow Q$

D $P \Rightarrow Q$

---

12. The value of c for which the function

$$f(x) = \begin{cases} x^2 - 1, & x < 3 \\ 3cx, & x \geq 3 \end{cases}$$

is continuous is

A $\frac{8}{9}$

B $\frac{9}{8}$

C $\frac{8}{3}$

D $\frac{3}{8}$

---

13. The first two non-zero terms in the Maclaurin series expansion of $\tanh^{-1}x$ are.

A $x - \frac{x^3}{3}$

B $x + \frac{x^3}{3}$

C $x - \frac{x^3}{2}$

D $x + \frac{x^3}{2}$

---

14. $(\mathbf{j} - 2\mathbf{k}) \times (\mathbf{i} - \mathbf{j} - \mathbf{k}) =$

A $-3\mathbf{i} + 2\mathbf{j} - \mathbf{k}$

B $-3\mathbf{i} - 2\mathbf{j} - \mathbf{k}$

C $\mathbf{i} - 2\mathbf{j} - \mathbf{k}$

D $\mathbf{i} + 2\mathbf{j} + \mathbf{k}$

---

15. The binary operation $*$ is defined on $\mathbb{R}$, the set of real numbers, as $a * b = a + b + 1$. The identity element is

A 2

B 1

C -1

D 0

16. The polar curves $r\cos\theta = 2$ and $r = 1 + \cos\theta$ intersect at the point

A $(0,2)$

B $\left(2,\frac{\pi}{2}\right)$

C $\left(\frac{\pi}{2},2\right)$

D $(2,0)$

17. The series $\sum_{r=1}^{\infty}\left(\frac{1}{r}\right)^k$ converges for

A $k > 1$

B $k \leq 1$

C $k = 1$

D $0 < k < 1$

18. If the function $f(x)$, $x \in \mathbb{R}$, has a limit at $x = a$, then

A $\lim_{x\to a} f(x) = f(a)$

B $\lim_{x\to a^-} f(x) = \lim_{x\to a^+} f(x)$

C $\lim_{x\to a^-} f(x) = f(a)$

D $\lim_{x\to a^+} f(x) = f(a)$

19. Given that $|z| = 3$, the maximum value of $|z-2|$ is

A 1

B 2

C 3

D 5

20. Let M be a matrix of order 2 and $\det(M) = p$, then $\det(2M) =$

A $8p$

B $4p$

C $2p$

D p

21. Two moving objects collide obliquely. Which one of the following is always true?

A They interchange their velocities.

B One of them comes to rest and the other continues to move.

C The impulse experienced by the heavier object is smaller.

D The velocity components perpendicular to the line of centre do not change.

22. A particle moves with constant angular velocity w on the curve with polar equation $r = ae^{k\theta}$, where a and k are positive constants. The radial component of the velocity of the particle is

A kwr

B $akwr$

C wr

D w

23. The particular integral of the differential equation $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = e^{2x}$ for some constants λ and μ could be $y =$

A λe^{2x}

B $\lambda x^2 e^{2x}$

C $\lambda e^{2x} + \mu e^{-x}$

D $\lambda x e^{2x}$

24. The moment of inertia of a rigid body of mass $2M$ about a given axis is $\frac{2}{9}Ma^2$. The radius of gyration about this axis is

A $\frac{a}{9}$

B $\frac{a^2}{9}$

C $\frac{a}{3}$

D $\frac{\sqrt{2}}{3}a$

25. A force **F**, acts through the point A, with position vector **a**, the position vector of another point B is **b**, the vector moment of **F** about B is

A $\mathbf{a} \times \mathbf{F}$

B $\mathbf{b} \times \mathbf{F}$

C $(\mathbf{a}-\mathbf{b}) \times \mathbf{F}$

D $(\mathbf{b}-\mathbf{a}) \times \mathbf{F}$

---

26. The probability distribution table for a discrete random variable X is

x	1	2	3
$P(X=x)$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{6}$

The mean value of X is

A $\frac{11}{6}$

B 2

C $\frac{5}{3}$

D 1

---

27. The random variable X has variance 2.

$Var(2X+1) =$

A 4

B 8

C 9

D 10

---

28. Given that $h\left(\frac{dy}{dx}\right)_n \approx y_{n+1} - y_n$ and $\frac{dy}{dx} = xy$,

then, $y_{n+1} \approx$

A $y_n + hx_n y_n$

B $y_n - hx_n y_n$

C $hx_n y_n - y_n$

D $hx_n y_n + x_n$

---

29. A uniform circular disc rotating about a smooth axis through its centre and perpendicular to its plane, with angular speed ω is brought to rest in 2 seconds the angular retardation of the disc in $rads^{-2}$ is

A 2ω

B ω

C $\frac{\omega}{2}$

D $2\omega^2$

---

30. The equation of motion of a particle performing simple harmonic motion is given by $\frac{d^2x}{dt^2} + 12x = 0$.

The period of motion is

A $\frac{\pi\sqrt{3}}{6}$

B $\frac{\pi\sqrt{3}}{3}$

C π

D $\frac{\pi}{2}$

---

31. The parabola $y^2 = 4(x+1)$ has as focus the point

A $(0,0)$

B $(-1,0)$

C $(1,0)$

D $(0,0)$

---

32. The series $\sum_{n=1}^{\infty} \frac{a}{n}$, $a > 0$

A converges to 0

B converges to 1

C converges to a

D diverges

33. Given that the position vector of a particle P of mass 2 kg is j m and its velocity is $(-\mathbf{i}+\mathbf{j})ms^{-1}$ then its moment of momentum is

A $2\mathbf{k}$ Ns

B $\mathbf{k}$ Ns

C $-\mathbf{k}$ Ns

D $-2\mathbf{k}$ Ns

34. When x is large and positive, $\cosh x \approx$

A e^x

B $\frac{1}{2}e^{-x}$

C $\frac{1}{2}e^{x}$

D $2e^x$

35. One of the asymptotes to the curve $xy - y - x = 0$ is

A $x = 1$

B $x = -1$

C $y = -1$

D $y = 0$

36. P and Q are non-singular square matrices of same order then $(PQ^{-1})^{-1} =$

A $Q^{-1}P$

B $P^{-1}Q$

C QP

D QP^{-1}

37. Given that $\mathbf{u}$ and $\mathbf{v}$ are two non-zero vectors such that $\mathbf{v} - \lambda\mathbf{u} = 0$ where λ is a real constant. Which of thefollowing is true?

A $\mathbf{u} \bullet \mathbf{v}=0$

B $\mathbf{u} \times \mathbf{v}=0$

C $\mathbf{u} \bullet \mathbf{v} = \lambda$

D $|\mathbf{u} \times \mathbf{v}| = \lambda$

38. A force $\mathbf{F}$ acts on a particle displacing it from the point $P(0,2,1)$ to the point $Q(2,-1,5)$. The work done on the particle is.

A $(2\mathbf{i} - 3\mathbf{j} + 4\mathbf{k}) \times \mathbf{F}$

B $\mathbf{F} \times (2\mathbf{i} - 3\mathbf{j} + 4\mathbf{k})$

C $(2\mathbf{i} - 3\mathbf{j} + 4\mathbf{k}) \bullet \mathbf{F}$

D $\mathbf{F} \bullet (2\mathbf{i} + 3\mathbf{j} + 4\mathbf{k})$

39. A particle P starts from the origin and moves on the curve with vector equation $\mathbf{r} = 2t\mathbf{i} + t^2\mathbf{j}$ when the displacement on the x-axis is 2, the displacement on the y – axis is

A $2\sqrt{2}$

B 1

C 2

D 4

40. One tangent at the pole to the polar curve $r = a(1 - 2\sin 2\theta), a > 0$, is $\theta =$

A $\frac{-\pi}{6}$

B $\frac{\pi}{6}$

C $\frac{\pi}{3}$

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

41. $\int_{-1}^{1} [x] dx =$

A -1

B 0

C 1

D 2

42. If $\begin{vmatrix} 1 & 2 & 3 \\ 1 & -1 & 2 \\ b^2 & b^2 & b \end{vmatrix} = k$, then $\begin{vmatrix} a & 2a & 3a \\ 1 & -1 & 2 \\ b^2 & b^2 & b \end{vmatrix} =$

A $\frac{k}{a}$

B ak

C $\frac{b}{k}$

D bk

---

43 . The real value function $f(x) = \sqrt{\frac{x-1}{x+1}}$ is continuous on

A $[1, +\infty[$

B $]-\infty, 1]$

C $[-1, 1]$

D $]-1, 1[$

---

44. Given that $|z| = 5$ then the least greatest value of $|z-2|$ is

A 2

B 3

C 5

D 7

---

45. Given the function

$F(x) = \int_{2x}^{x^2} f(t)dt$, $F'(x) =$

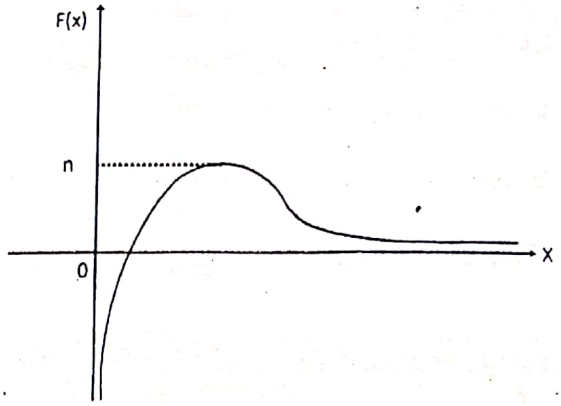
A $2xf(x^2)$

B $2xf(x^2) - 2f(2x)$

C $2f(x) - f(2x)$

D $f(x^2) - f(2x)$

46.



From the graph of F ,the equation $F(x) = m$ has two distinct real roots, if

A $m \geq n$

B $m \leq n$

C $0 < m < n$

D $0 \leq m \leq n$

---

47. xyz_5 in base 10 is

A $15x + 10y + z$

B $25x + 5y + z$

C $25z + 5y + x$

D $25x + 10y + z$

---

48. If $4x \equiv 3 \bmod 7$, then $x =$

A 2

B 4

C 6

D 8

---

49. The structure $(\{0,1,2,3,4,5\},\times_6)$, where $\times_6$ denotes multiplication modulo 6, is not a group since the structure

A is not closed

B is not associative

C has no identity element

D has no inverses for all elements.

50. Which of the following sequences below is divergent?

A $\left\{\frac{2n}{3n^2+15}\right\}$

B $\left\{\frac{2n}{3n+17}\right\}$

C $\left\{\frac{2n}{n^2+n+1}\right\}$

D $\{2^{-n}\}$

STOP

GO BACK AND CHECK YOUR WORK