NATIONAL EDUCATIONAL ASSESMENT AND EXAMINATIONS AGENCY (NEAEA)
ETHIOPIAN UNIVERSITY ENTRANCE EXAMINATION (EUEE)
MATHEMATICS EXAMINTION 2005

BOOKLET CODE: 00
NUMBER OF ITEMS:

SUBJECT CODE: 00
TIME ALLOWED: 00

1. If $\{a_n\}$ is a sequence such that $a_1 = 2$, and $a_{n+1} = a_n + 4$ for all $n \geq 1$, then $\sum_{n=1}^{35} a_n$ is equal to : Not Answered

- A) 2460
- B) 2458
- C) 2450✔
- D) 2442

2. If $f(x) = x^2 + 2\ln x$, then $\lim_{h\to 0} \frac{f(2+h)-f(2)}{h}$? Not Answered

- A) 5✔
- B) 4
- C) 2
- D) 0

3. If $f(x) = e^{2x} + x - 3\cos x$, then what is $f''(x)$? Not Answered

- A) $e^{2x} + 1 - 3\sin(x)$
- B) $e^{2x} + 1 + 3\sin(x)$
- C) $4e^{2x} - 3\cos(x)$
- D) $4e^{2x} + 3\cos(x)$✔

4. Which one of the following intervals does $f(x) = x^4 + 4x$ increase? Not Answered

- A) $(-\infty, -1]$
- B) $(-\infty, 0]$
- C) $[-1, \infty)$✔
- D) $(-\infty, \infty)$

5. Which one of the following is the simplest form of $|3+4i| - \frac{25i}{3+4i}$ Not Answered

A) 5 ? 5i

B) 5 + 5i

C) 1 + 3i

D) 1 ◆ 3i✔

6. If Z = cos (π /10) + isin (π/10), then what is the value of Z^5? Not Answered

A) π/2 + π/2 i

B) 1/2 + 1/2 i

C) i✔

D) 1 + i

7. What is the value of | x | + 2x if x ≤0 ? Not Answered

A) -3x

B) 3x

C) ◆x

D) x✔

8. Suppose A= $\begin{pmatrix} 1 & 2 \\ 2 & 3 \end{pmatrix}$ if x is a 2 x 2 matrix such that AX - A^T =2A, then what is the value of x?

Not Answered

A) $\begin{pmatrix} 3 & 1 \\ 1 & 3 \end{pmatrix}$

B) $\begin{pmatrix} 3 & 3 \\ 3 & 3 \end{pmatrix}$

C) $\begin{pmatrix} 3 & 6 \\ 6 & 9 \end{pmatrix}$

D) $\begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$ ✔

9. Suppose that A and B are 3 x 3 matrices, I is the identity matrix of order 3 such that AB=2I. If det B= | B |= 6. What is det (A^T)? Not Answered

A) 1/3✔

B) 4/3

C) 12

D) 48

10. What is the 50th term of the sequence 3, 10, 17, 24, 31,◆? Not Answered

A) 310

B) 346✔

C) 510

D) 531

11. For real members x and y, which one of the following statements is true? Not Answered

A) $(\forall x)(\exists y)(x^2 + y + 1=0)$✔

B) $(\exists x)(\forall y)(x^2 + y + 1 = 0)$

C) $(\exists y)(\forall x)(x^2 + y + 1 = 0)$

D) $(\forall y)(\exists x)(x^2 + y + 1 = 0)$

12. Which one of the following functions has NO vertical asymptote? Not Answered

A) $f(x)= ln(x+1)$

B) $f(x) = \frac{x^2+1}{x^3+8}$

C) $f(x) = \frac{x^2-9}{x-3}$ ✔

D) $f(x)= \frac{x-1}{x^2-x}$

13. Let p, q and r be propositions such that $p \Rightarrow (r \vee \neg q)$ is false. Then, which one of the following propositions is true? Not Answered

A) $p \Rightarrow r$

B) $\neg r \Rightarrow q$✔

C) $\neg q \Rightarrow q$

D) $q \Leftrightarrow r$

14. If $f(x)= \frac{1}{e^x+1}$, then which one of the following is equal to $f^{-1}(x)$ for $0 < x < 1$?

Not Answered

A) $\ln(1 - x) - \ln(x)$✔

B) $e^{-x} + 1$

C) $\ln(1/x+1)$

D) $1/e^{-x} + 1$

15. If $x^2 - 6x + y^2 + k = 0$ is equation of a circle with radius 2, then what is the value of k? Not Answered

A) 13

B) 5✔

C) 4

D) -4

16. If a line with angle of inclination of $3\pi/4$ passes through (0, 1), which one of the following is the equation of the line? Not Answered

A) y= -x + 1✔

B) y= x + 1

C) y= -x - 1

D) y= x - 1

17. If g(x) = x f(x) - $\sqrt{f(x)}$ and f(2) = f '(2) = 4, then which of the following is equal to g'(2)?
Not Answered

A) 11✔

B) 8

C) 2

D) 0

18. What is the sum of the series $\sum_{n=1}^{\infty} \frac{2^{2n+1}}{5^{n-1}}$ Not Answered

A) 40✔

B) 20

C) 10

D) 8

19. What is the value of $\lim_{x\to\infty} \left(1+\frac{1}{x}\right)^{\frac{-x}{2}}$? Not Answered

A) $\frac{1}{\sqrt{e}}$ ✔

B) $\sqrt{e}$

C) e^{-2}

D) ∞

20. Among students who took a quiz, 15 students scored 6, 20 students scored 7, 10 students scored 8 and 5 students scored 10. What is the average score of the students? Not Answered

A) 7.8

B) 7.5

C) 7.2✔

D) 7.0

21. A parabola with focus (3, -1) has directrix y = 3. Which one of the following is the equation of the parabola? Not Answered

A) $(x - 3)^2 = -4(y + 1)$

B) $(x - 3)^2 = -8(y - 1)$✔

C) $(x - 3)^2 = 4(y + 1)$

D) $(x - 3)^2 = 8(y - 1)$

22. How many four digit even numbers can be formed from 1, 2, 3, 4 and 5 if the numbers start with 3?

Not Answered

A) 40

B) 50✔

C) 100

D) 120

23. A satellite moves along a hyperbolic curve whose horizontal transverse axis is 24 km and an asymptote y = 5/12 x + 2. Then, what is the eccentricity of the hyperbola? Not Answered

A) 5/13

B) 12/13

C) 13/12✔

D) 15/3

24. What is an anti-derivative of $f(x) = \frac{2}{4x^2+4x+1}$? Not Answered

A) $\frac{1}{2x+1}$

B) $\frac{-2}{2x+1}$

C) $-\frac{1}{2x+1}$ ✔

D) $\ln(4x^2\ 4x+1)$

25. At which valeu(s) of x does $f(x) = 0.25\ x^4 - 2x^2$ have a local maximum? Not Answered

A) x = 4

B) x = 0✔

C) x = -2 and x = 2

D) x = 0 and x = 2

26. In the set of complex numbers, which one of the following is the solution set of $Z^3 - iZ^2 + 2Z = 0$?

Not Answered

A) {0}

B) {0, -i}

C) {0, -i, 2i}✔

D) {0, i, -2i}

27. The population of certain country is currently 80 million with growth rate of 2% per year.

Given: $(0.02)^9 = 5.12 \times 10^{-16}$, $(1.02)^9 = 1.19$
$(0.02)^{10} = 1.024 \times 10^{-17}$, $(1.02)^{10} = 1.22$

which one of the following is the best approximation of the population after 10 years? Not Answered

- A) 81.9 million
- B) 86.8 million
- C) 95.2 million
- D) 97.6 million✔

28. The volume V of a melting ice cube after t seconds is $V= 2000 - 40t + 0.2t^2$ (in cm^3). How fast is the volume changing when t=40 seconds? Not Answered

- A) 24 cm^3/sec
- B) 15cm^3/sec
- C) -15 cm^3/sec
- D) -24cm^3/sec✔

29. Which one of the following is equal to $\lim_{n\to\infty} \frac{1-n-3n^2}{6n^2+1}$? Not Answered

- A) 1/6
- B) -1/2✔
- C) -1/6
- D) -∞

30. What is the solution set of $\frac{2}{x} - \frac{x-2}{x^2-2x} = 1 - \frac{2x-2}{3x-2}$? Not Answered

- A) {1,-2}
- B) {1,2}
- C) {-1}
- D) {1}✔

31. Let $f(x) = \begin{cases} 3^x + k, if\ x \le 0 \\ 3\frac{\sin(2x)}{x}, if\ x > 0 \end{cases}$ if f is continuous at x=0, then what is the value of k? Not Answered

- A) 6
- B) 5✔
- C) 2
- D) 0

32. Which one of the following is equal to $\int(1+ x)3^x$ dx? Not Answered

- A) $(1 + x)3^x - 3x + c$
- B) $(1 + x)3^x + (\log_3 e)3^x + c$

C) $(1 + x)3^x \log_3 e - (\log_3 e)^2 3^x + c$ ✔

D) $(1 + x)3^x \log_3 e - 3^x (\log_3 e) + c$

33. A committee consisting of 3 students is to be selected from 10 candidates among which 4 are girls. What is the probability that at least one girl is selected? Not Answered

A) 5/6 ✔

B) 2/3

C) 1/3

D) 1/6

34. A group of six students take their seats at random in a round table for a discussion. What is the probability that two specific students do NOT sit together? Not Answered

A) 3/5 ✔

B) 2/3

C) 2/5

D) 1/3

35. Given f(x) = ln(x-1) and $g(x) = \sqrt{1 - 2x}$, which one of the following is the domain of f o g? Not Answered

A) $\{x \in R: x > 1\}$

B) $\{x \in R: x \leq 1/2\}$ ✔

C) $\{x \in R: x < 0\}$

D) $\{x \in R: x > 1/2\}$

36. The mark that students scored in an examination is grouped in class intervals as shown in the following table.

Class Interval (Mark)	Number of Students
55 - 64	8
65 - 74	12
75 - 84	20
85 - 94	6
95 - 100	4

What is the median of the mark? Not Answered

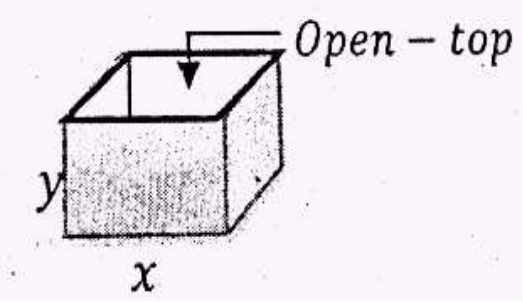
A) 25.0

B) 75.5

C) 77.0 ✔

D) 79.5

37. A box seen below is to have a square base, an open top and volume of 32 cubic units. If x is the length of each side of its base and y is its height, how many units should x and y be in order to make the box with the smallest amount of material?



Not Answered

- A) x = 4, y =2✔
- B) x = 2, y = 8
- C) x = √8 , y = 4
- D) x = √2, y = 16

38. Which one of the following is equal to $\int \frac{1}{x^2+x}\,dx$ **?** Not Answered

- A) $\ln|x^2 + x| + c$
- B) $2\ln|x + 1| + \ln|x| + c$
- C) $\ln|x| - \ln|x + 1| + c$✔
- D) $\ln|x| + \ln|x + 1| + c$

39. Consider the following argument:
If he does not love her, she will not marry him.
He loves her. Therefore, she will marry him.
If p? he loves her and q ? she will marry him, which one of the following is the correct representation of the argument and its validty? Not Answered

- A) $\neg p \Rightarrow \neg q,\ p \vdash q$: valid argument
- B) $\neg p \Rightarrow \neg q,\ p \vdash q$; invalid argument✔
- C) $p \Rightarrow q,\ p \vdash q$; valid argument
- D) $p \Rightarrow q,\ p \vdash q$; valid argument

40 What is the value of $\int_0^{\frac{\pi}{2}} 2x\ cosx\ dx$? Not Answered

- A) π - 2✔
- B) π/2+1
- C) π+2
- D) π/2-1

41. A box contains 5 white, 6 red and 4 black balls of all identical size. If 3 balls are randomly taken out of the box after the other, what is the probability that the first ball is white and both the second and third balls are red? Not Answered

- A) 2/15

B) 3/15

C) 4/75

D) 5/91✔

42. Which one of the following is the equation of the line tangent to the graph of f(x) = 1/(x+1) + cosx at (0,f(0))? Not Answered

A) x + y = 1

B) x - y = -2

C) x + y = 2✔

D) x + 4y = 2

43. Which one of the following is equal to $\lim_{x\to 1}\frac{\sqrt{x}-1}{x^2-1}$ **?** Not Answered

A) ∞

B) 0

C) -1/4

D) 1/4✔

44. Which one of the following is equal to $\lim_{x\to 1}\frac{1-x}{1-\frac{1}{x^2}}$ **?** Not Answered

A) 1

B) 0

C) -1/2✔

D) Doesn't exist

45. Which one the following is equal to $\int \frac{ln(xe^x)}{x}dx$ Not Answered

A) $\ln|x| + \frac{1}{2}e^x + c$

B) $\frac{1}{2}(lnx)^2 + x + c$ ✔

C) $\ln|x| + e^{2x} + c$

D) $-\frac{1}{x^2} + lnx)^2 + c$

46. Consider the system $\begin{cases} \alpha x + y + z = 1 \\ x + 2y + 4z = 0 \\ 5x + y + z = 0 \end{cases}$ if the determinant of the coefficient matrix is 2, then what is the solution of the system of the equations?

Not Answered

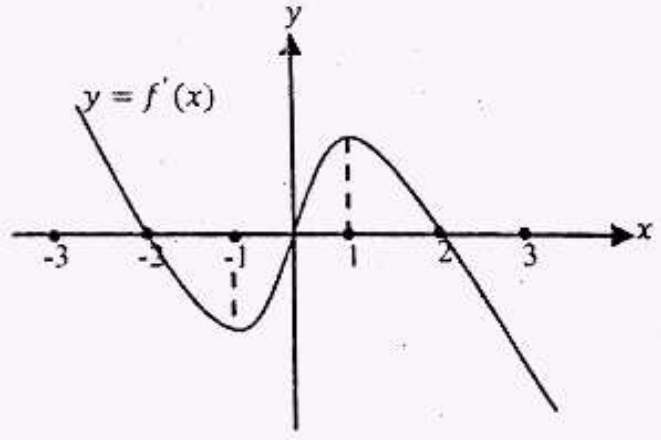
A) $\left(3\alpha, \frac{19\alpha}{2}, \frac{-11\alpha}{2}\right)$

B) $\left(3, \frac{19}{2}, \frac{-11\alpha}{2}\right)$

C) $\left(\frac{3}{\alpha}, \frac{19}{2\alpha}, \frac{-11}{2\alpha}\right)$ ✔

D) $\left(\frac{3}{2}, \frac{19}{2}, \frac{9}{2}\right)$

47. Suppose f is differentiable on (-∞,∞) and the graph of its derivative is as shown below. Which one of the following is true about f ?



Not Answered

A) f is decreasing on (-∞, -1)∪[1, ∞)

B) f has a local minimum at x = -2

C) f is concave down on [0, ∞)

D) f is concave up on (-1, 1)✔

48. Which one of the following is true about the derivative of f(x) = x|x|? Not Answered

A) f is not differentiable at x = 0

B) f ' (x) = 2 |x|, for every x ∈ (-∞, ∞)✔

C) f ' (x) = 2x, for every x ∈ (-∞, ∞)

D) f ' (x) = |x|+ x, for every x ?(-∞, ∞)

49. What is the area of the region between the graphs of $y = x^2$ and y = -x + 2, where $0 \leq x \leq 2$? Not Answered

A) 3✔

B) 2

C) 3/2

D) 2/3

50. For what value of b does the parabola $p(x) = ax^2 + x + b$ pass through the points (-1, 5) and (2, -1)?

Not Answered

A) 9✔

B) 3

C) -3

D) -15

51. If $f(x) = 2 - \frac{1}{2}\sin\left(\frac{\pi}{2}x\right)$, then which one of the following is the amplitude and period of f, respectively? Not Answered

A) 1/2 and 4
B) -1/2 and 4
C) 2 and π✔
D) 1/2 and π

52. Which one of the following is equal to sec(π/2 -x) $\sin^3 x$ + cos2x? Not Answered

A) 2cosx
B) 2sinx
C) cos2x✔
D) sin2x

53. Suppose P(1, 2, 1) and Q(1, 0, 2) are points in space and $\vec{A} = \overrightarrow{PQ}$. If $\vec{B}$ is parallel to $\overrightarrow{PQ}$ and $\vec{A}.\vec{B} = -10$, then which one of the following is true? Not Answered

A) $\vec{A}$ and $\vec{B}$ has the same direction
B) $\|\vec{B}\| = 10\|\vec{A}\|$
C) $\|\vec{B}\| = \frac{1}{10}\|\vec{A}\|$
D) $\|\vec{B}\| = 2\|\vec{A}\|$ ✔

54. What is the solution of $\cos^2 x + 0.5 \sin 2x = 1$ in the interval [0, 2π)? Not Answered

A) {0, π/4, π, 5π/4}✔
B) {0, π/4, 3π/4, π}
C) {0, π}
D) {0, π/4, π}

55. If $\vec{u} = (-3, x)$ and $\vec{v} = (x, y-2)$ are vectors, what is the value of y so that $\vec{u} + \vec{v} = 3\vec{u} - \frac{1}{2}\vec{v}$? Not Answered

A) 2/3
B) -10/3✔
C) -4
D) -22/3

56. Which one of the following points is closer to the sphere $x^2 + y^2 + z^2 - 2x + 6z + 9 = 0$? Not Answered

A) (1, 0, 0)

B) (0, 0, 0)

C) (0, -1, 0)

D) (0, 0, -1)✔

57. Which one of the following describes the principle of Mathematical Induction on a set of natural numbers?

Not Answered

A) if an assertion is true for a natural number n, then it is true for n + 1.

B)if an assertion is true for 1 and it is true for n = 1, then it is true for some n.

C) if an assertion holds for n = 20 and for an n ≥ 20, then it is true for n implies true for n + 1.

D) if an assertion is true for n = 1 and is true for n = k, whenever is true for n = k + 1.✔

58. What is the cot(arc sinx) if 0 < x< 1? Not Answered

A) $\frac{x}{\sqrt{1-x^2}}$

B) $\frac{1}{x}\sqrt{1-x^2}$ ✔

C) $\sqrt{1-x^2}$

D) $\frac{1}{\sqrt{1-x^2}}$

59. Suppose $\vec{A} = 2\vec{J} - \vec{k}$ and $\vec{B} = 5\vec{\imath} + 15\vec{k}$, where $\vec{\imath}, \vec{J}$ *and* $\vec{k}$ are the standard unit vectors in the directions of positive x,y and z axis, respectively. Which one of the following is the unit vector in the direction of $\vec{A} + \frac{1}{5}\vec{B}$?

Not Answered

A) $\frac{3}{5}\vec{\imath} + \frac{4}{5}\vec{k}$

B) $\frac{1}{3}\vec{\imath} + \frac{2}{3}\vec{j} + \frac{2}{3}\vec{k}$ ✔

C) $\frac{4}{5}j - \frac{3}{5}k$

D) $\frac{2}{3}i - \frac{1}{3}j + \frac{2}{3}k$

60. A line given by a vector equation r(t)=(0, 3) + t(1, 1) is tangent to a circle at point (0,3). If the radius of the circle is ?2 which one of the following is the center of the circle? Not Answered

A) (1,4)

B) (1,-4)

C) (-1,2)

D) (1,2)✔

61. Suppose the following statements are the premises of an argument.
He was lazy or he did not like the classroom.
If he was lazy, he could not pass the exam.
He passed the exam.
Which one of the following can be a conclusion that makes the argument valid? Not Answered

- A) He did like the classroom.
- B) He did not like the classroom. ✔
- C) If he was not lazy, he did like the classroom.
- D) He was not lazy and he did like the classroom.

62. What is the image of the ellipse whose equation is $2(x + 2)^2 + (y - 1)^2 = 2$ under a translation that takes (2, 1) to (4, 0) followed by a rotation of 90^0? Not Answered

- A) $x^2 + 2y^2 = 2$ ✔
- B) $2x^2 + y^2 = 2$
- C) $2(x - 4)^2 + y^2 = 2$
- D) $(x - 4)^2 + 2y^2 = 2$

63. Let $\vec{a} = 2\vec{\imath} + (x-1)\vec{\jmath} + \vec{k}$ and $\vec{c} = \vec{\imath} - \vec{\jmath} + y\vec{k}$ be vectors. If $\vec{a}.\vec{c} = 0$ and $\|\vec{a}\| = 3$ which one of the following is a possible value of y?

Not Answered

- A) -4 ✔
- B) -1
- C) 3
- D) 4

64. If $\vec{A}$ is perpendicular to $\vec{B}$, what is the cosine of the angle between $\vec{A}$ and $\vec{A} - \vec{B}$?

Not Answered

- A) $\frac{\|\vec{A}-\vec{B}\|}{\|\vec{A}\|}$
- B) $\frac{\|\vec{A}\|}{\|\vec{A}-\vec{B}\|}$ ✔
- C) $\frac{\|\vec{A}-\vec{B}\|}{\|\vec{B}\|}$
- D) $\frac{\|\vec{B}\|}{\|\vec{A}-\vec{B}\|}$

65. Which one of the following is necessarily true? Not Answered

- A) If $\|\vec{A}\| = \|\vec{B}\|$, then $\vec{A} = \vec{B}$
- B) $\|k\vec{A}\| = K\|\vec{A}\|$, for any real number k

C) if $\vec{A}$ is parallel to $\vec{B}$, then $\vec{A}.\vec{B} = 0$

D) if $\vec{u}$ is a unit vector in the direction of $\vec{A}$, then $\vec{A}.\vec{u} = \|\vec{A}\|$ ✔

Your Answers

you have scored 0 out of 0

Answer Key

1.C	11.A	21.B	31.B	41.D	51.C	61.B
2.A	12.C	22.B	32.C	42.C	52.C	62.A
3.D	13.B	23.C	33.A	43.D	53.D	63.A
4.C	14.A	24.C	34.A	44.C	54.A	64.B
5.D	15.B	25.B	35.B	45.B	55.B	65.D
6.C	16.A	26.C	36.C	46.C	56.D	
7.D	17.A	27.D	37.A	47.D	57.D	
8.D	18.A	28.D	38.C	48.B	58.B	
9.A	19.A	29.B	39.B	49.A	59.B	
10.B	20.C	30.D	40.A	50.A	60.D	

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