NATIONAL EDUCATIONAL ASSESMENT AND EXAMINATIONS AGENCY (NEAEA)
ETHIOPIAN UNIVERSITY ENTRANCE EXAMINATION (EUEE)
MATHEMATICS EXAMINTION 2009

BOOKLET CODE: 00
NUMBER OF ITEMS:

SUBJECT CODE: 00
TIME ALLOWED: 00

1. If A = (a_{ij})3x3 is a square matrix with $A^{-1} = \begin{bmatrix} 1 & 3 & 2 \\ 1 & 1 & 3 \\ 0 & 4 & 5 \end{bmatrix}$, then what is the cofactor of a_{23}?. Not Answered

- A) -3/14
- B) -2/7✔
- C) 2/7
- D) -3/7

2. A team of 10 researchers consist 4 biologists and 6 chemists. If 3 persons are chosen randomly from the team, what is the probability that at least one is a biologist? Not Answered

- A) 2/3
- B) 2/5
- C) 5/6✔
- D) 7/10

3. The probability that an electronic device produced by a company does not function properly is equal to 0.1. If 2 devices are bought, then what is the probability that at least one device function properly? Not Answered

- A) 0.81
- B) 0.09
- C) 0.18
- D) 0.99✔

4. Two machines A and B produce respectively 60% and 40% of the total number of items of a factory. The percentages of defective output of these machines are 2% and 5%, respectively. If an item is selected at random, then what is the probability that the item is defective? Not Answered

- A) 0.032
- B) 0.07✔
- C) 0.32
- D) 0.426

5. In how many ways can a committee of 3 members be formed from 7 candidates? Not Answered

- A) 7
- B) 21
- C) 28
- D) 35✔

6. The following is a frequency distribution table of a grouped data with variable X.

X	3-7	8-12	13-17	18-22
Frequency	4	6	8	2

What is the mean ($\bar{x}$) and the variance (s^2) of the data respectively? Not Answered

- A) $\bar{x}$ = 12, s^2 = 21✔
- B) $\bar{x}$ =12, s^2 = 25
- C) $\bar{x}$ =13, s^2 = 9
- D) $\bar{x}$ =13, s^2 = 16

7. The expenditure of 100 families is given below.

Expenditure	0-9	10-19	20-29	30-39	40-49
No. of Families	14	23	f_1	21	f_2

The mode of the data is 23.5, what are the values of f1 and f2 Not Answered

- A) $f_1 = 27, f_2 = 15$ ✔
- B) $f_1 = 15, f_2 = 27$
- C) $f_1 = 25, f_2 = 17$
- D) $f_1 = 17, f_2 = 25$

8. The first group of 10 children has a mean weight of 15.6kg, the second group of another 10 children has a mean weight of 16kg, and the third group of children has a mean weight of 20kg. If the mean weight of all the children is 17kg, what is the total number of children in all of the three group? Not Answered

- A) 28✔
- B) 29
- C) 30
- D) 32

9. Which of the following is a valid argument? Not Answered

- A) $\neg p \Rightarrow \neg q, q \vdash \neg p$
- B) $p \Rightarrow \neg q, p, r \Rightarrow q \vdash \neg r$✔
- C) $\neg p \vee q, r \Rightarrow p, r \vdash \neg q$
- D) $\neg p, p \vee q, r \Rightarrow q \vdash \neg r$

10. Consider the following open propositions: P(x) =x is a prime number, C(x) =x is a composite number, and E(x) =x is an even number, which one of the following has a truth value of True in the set of positive integers?

Not Answered

- A) $(\forall_x)[P(x) \Rightarrow \neg E(x)]$
- A) $(\forall_x)[P(x) \Rightarrow \neg E(x)]$
- A) $(\forall_x)[P(x) \Rightarrow \neg E(x)]$ ✔
- A) $(\forall_x)[P(x) \Rightarrow \neg E(x)]$

11. Which of the following functions is a one to one correspondence? Not Answered

- A) f : [0, ∞) ⟶ ℜ definded by f(x)= |x|
- B) f : ℜ ⟶ [0, ∞) definded by $f(x)= x^2$
- C) f : ℜ ⟶ [0, ∞) definded by $f(x)= 3^x$
- D) f:(0, ∞) ⟶ ℜ definded by $f(x)= \log_2 x$ ✔

12. If $f(x)=\sqrt{x^3}$ and $(f \circ g)(x)= \sqrt[4]{x}$, then what is the value of g(8)? Not Answered

- A) $\sqrt[3]{2}$
- B) 2
- C) $\sqrt{2}$ ✔
- D) $2\sqrt{2}$

13. Which one of the following is the inverse of $f(x) = 8x^3 + 2$? Not Answered

- A) $f^{-1}(x) = \frac{1}{8x^3+2}$
- B) $f^{-1}(x) = \frac{1}{2}\sqrt[3]{x-2}$ ✔
- C) $f^{-1}(x)= 8x^{-3} + 2$
- D) $f^{-1}(x) = \frac{1}{8}\sqrt[3]{x-2}$

14. What is the solution set of $\frac{1}{1+\frac{1}{x}} - \frac{1}{1-\frac{1}{x}} = \frac{x+\frac{1}{x}}{x-\frac{1}{x}}$**?** Not Answered

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

15. Which one of the following is true about the graph of $\frac{x^3}{x^3(x-1)}$ Not Answered

- A) the vertical asymptotes of the graph are x = 0 and x = 1
- B) a horizontal asymptote of the graph is y = 1
- C) the graph intersects its horizontal asymptote at a point (-1, 0)✔
- D) the graph intersects the vertical line x = 1 at a point (1, 2)

16. What is the equation of a line that passes through point (a, a) in xy-plane if it is parallel to a line that passes through points (a, b) and (b, a) where $a \neq b$? Not Answered

- A) y = x
- B) y = -x
- C) y = -x + 2a✔
- D) y= 2x - a

17. What are the values of the center (C) and radius (r) of a circle $x^2 + y^2 - 4x + 6y = 5$? Not Answered

- A) C= (-2, 3), r = $3\sqrt{2}$
- B) C= (2,-3), r = $3\sqrt{2}$✔
- C) C= (2,-3), r = $2\sqrt{3}$
- D) C= (-2,3), r = $2\sqrt{3}$

18. What is the radius of the largest possible circle that can be inscribed in the ellipse given by $5(x - 1)^2 + 3y^2 = 15$? Not Answered

- A) $\sqrt{3}$✔
- B) $\sqrt{5}$
- C) 3
- D) 5

19. Suppose the eccentricity of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is reciprocal to that of the eccentricity of the ellipse $x^2 + 4y^2 = 4$. If the hyperbola passes through the focus of the ellipse, then what is the equation of the hyperbola? Not Answered

- A) $x^2 - 2y^2 = 2$
- B) $x^2 - 3y^2 = 3$✔
- C) $x^2/3 - y^2/2 = 1$
- D) $x^2/2 - y^2/3 = 1$

20. Let p and q stands for the statements "Nejat is intelligent" and "Almaze is hardworking". Respectively, which of the following represent the statement "Almaze is hardworking if Nejat is intelligent"? Not Answered

- A) $\neg p \wedge q$
- B) $\neg p \vee q$✔

C) $p \wedge q$

D) $\neg q \vee p$

21. Let f be differentiable function with f(1) = -1 and f '(1)= 1. If g(x) = [f(2x + 1) + 2]^2, then what is the value of g '(0)? Not Answered

A) 4✔

B) 2

C) -2

D) -4

22. If f(x) = ln(x^2 + 2), then what is the value of f ''(1)? Not Answered

A) 3/2

B) 5/9

C) 2/3

D) 2/9✔

23. If x^2 + xy = 10, then what is the value of $\frac{dy}{dx}$ when x = 2? Not Answered

A) -7/2✔

B) 2/7

C) 3/2

D) 7/2

24. What is the equation of the tangent line to the graph of f(x) =3x^2 + 4x - 5 at (1, 2)? Not Answered

A) 10x - y - 8 =0✔

B) -10x + y - 8 = 0

C) -10x - y - 8 = 0

D) 10x + y - 8 = 0

25. If f(x) = π2 + 1, then what is the value of f'(x)? Not Answered

A) 2π + 1

B) 2 π

C) 2

D) 0✔

26. Suppose f is continuous on [2, 6] and the only solutions of the equation f(x) = 7 are x = 2 and x = 5. If f(3) = 9, then one of the following Can Not be the value of f(4)? Not Answered

A) 5✔

B) 7.5

C) 8

D) 9

27. What is the value of k so that $f(x) = \begin{cases} \frac{\tan 2x}{x}, & if\ x > 0 \\ k - e^x, & if\ x \leq 0 \end{cases}$ **if continuous at x = 0?** Not Answered

- A) 2
- B) 3✔
- C) 1
- D) 0

28. If f is continuous at x = 0 and $g(x) = \sqrt{x}\,(2f(x) + \frac{3}{\sqrt{x}})$ **for all x>0, then what is the value of** $\lim_{x \to 0^+} g(x)$? Not Answered

- A) 0
- B) 2
- C) 3✔
- D) 5

29. What is the value of $\lim_{x \to 0} \frac{\sin x \cos 2x}{x^2+3x}$? Not Answered

- A) 1/3✔
- B) 2/3
- C) 1
- D) 2

30. If a ≠ 0, then what is the value of $\lim_{x \to 0} \frac{\sin x \cos 2x}{x^2+3x}$? Not Answered

- A) $1/a^2$
- B) $1/2a^2$✔
- C) $1/6a^2$
- D) 0

31. What are the values of λ and μ so that the system $\begin{cases} x + y + z = 6 \\ x + 2y + 3z = 10 \\ x + 2y + \lambda z = \mu \end{cases}$ **has infinitely many solutions?**

Not Answered

- A) $\lambda \neq 3$ and $\mu \in \Re$
- B) $\lambda = 3$ and $\mu \neq 10$
- C) $\lambda = 3$ and $\mu = 10$✔
- D) $\lambda \in \Re$ and $\mu = 10$

32. When $\begin{vmatrix} a & b & c \\ a & -a & a \\ a & a & -a \end{vmatrix} = a^3$, **and a ≠ 0, what is the solution of** $\begin{bmatrix} a & b & c \\ a & -a & a \\ a & a & -a \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$?

Not Answered

- A) x = 0, y = 2a, z = 2a
- B) x = 1/a , y = -2a, z = 2a
- C) x = 1/a, y = 2/a , z = 2/a
- D) x = 0, y = 2/a, z = 2/a ✔

33. If $z_1 = \frac{2-i}{1+i}$ *and* $z_2 = \frac{1+i}{1-i}$, then what is the value of $z_1 + 2z_2$? Not Answered

- A) 1 + i
- B) $\frac{i+1}{2}$ ✔
- C) $\frac{i+2}{2}$
- D) 1 - i

34. Which one of the following is the conjugate of $|3 + 4i| - \frac{25i}{3+4i}$ **? ?** Not Answered

- A) 5 + 3i
- B) 1 + 3i ✔
- C) 3 - 5i
- D) 1 - 3i

35. If $z = \sqrt{2}cos\left(\frac{\pi}{12}\right) + i\sqrt{2}sin\left(\frac{\pi}{12}\right)$, then what is the value of z^3? Not Answered

- A) 2 + 2i ✔
- B) $\sqrt{2} + \sqrt{2}\,i$
- C) $2\sqrt{2} + 2\sqrt{2}\,i$
- D) $3\sqrt{2} + 3\sqrt{2}\,i$

36. Which of the following relations holds for the sequence: -10, -3, 4, 11,...? Not Answered

- A) $a_n = a_{n-1} - 8$
- B) $a_n = a_{n-1} + 7$ ✔
- C) $a_n = a_{n-1} - 7$

D) $a_n = a_{n-1} + 8$

37. What is the sum of $\sum_{n=1}^{30}(-1)^n\left(\frac{1}{n}+\frac{1}{n+1}\right)$? Not Answered

A) -29/30

B) 29/30

C) 30/31

D) -30/31 ✔

38. Which of the following is the sum of the series $5-\frac{10}{3}+\frac{20}{9}-\frac{40}{27}+\cdots$? ? Not Answered

A) -5

B) -3

C) 3 ✔

D) 5

39. Suppose a radioactive material loses one third of its mass per year. If its current mass is 81g, then how much will its mass be just after 7 years? Not Answered

A) 27g

B) 1/27g

C) 128/27g

D) 128/81g ✔

40. Which one of the following is a convergent sequence? Not Answered

A) $\left\{\left(\frac{5}{3}\right)^n\right\}$

B) $\left\{\frac{2n}{n+1}\right\}$ ✔

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

D) $\left\{\frac{(-1)^n}{3}\right\}$

41. What is the value of the area of the region enclosed by the graph of $f(x) = e^x$ and $g(x) = x$ between the lines $x = -1$ and $x = 1$? Not Answered

A) $\frac{e^2-1}{e}$ ✔

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

C) $e^2 - \frac{1}{e} + 2$

D) $e - \frac{1}{e} + 2$

42. If f(0) = -1, f(1) = 2 and f'(x) is continuous on [0, 1], then which of the following is equal to $\int_0^1 f'(x)\sqrt{2+f(x)}dx$? Not Answered

A) 16/3

B) 14/3 ✔

C) 8/3

D) 4/3

43. Which of the following is equal to the volume of a solid generated when the region bounded by the graph of $y = 2\sqrt{x+1}$ and x-axis, when $0 \le x \le 2$, rotates about the x-axis? Not Answered

A) 8π

B) $8\pi^2$

C) 16π ✔

D) $16\pi^2$

44. A particle moves along the x-axis with velocity given by $v(t) = 3t^2 + 6t$ for time t = 0. If the particle is at position x = 2 at a time t = 0, what is the position of the particle at t = 1? Not Answered

A) 6 ✔

B) 9

C) 11

D) 12

45. Which of the following is equal to $\int x\left(e^x + \sin(x^2)\right)dx$? Not Answered

A) $e^x(x+1) + \frac{1}{2}\sin(x^2) + c$

B) $e^x(x-1) - \frac{1}{2}\sin(x^2) + c$

C) $e^x(x-1) - \frac{1}{2}\cos(x^2) + c$ ✔

D) $e^x(x-1) + \frac{1}{2}\cos(x^2) + c$

46. What is the value of $\int_0^{In\sqrt{3}} \frac{e^x}{e^{-x}+e^x} dx$? Not Answered

A) $\frac{1}{2}ln2$ ✔

B) In 4

C) In 2

D) 1

47. Suppose f:(-∞, ∞) ⟶ R is differentiable and the graph of its derivative y = f '(x), is as shown in the figure below. Which one of the following is true about f? Not Answered

A) f is increasing on (1, ∞)

B) f is concave upward on (0, ∞)

C) f has no relative maximum value

D) f has a relative minimum value at x = 2 ✔

48. If 2 ≤ f'(x) ≤ 4 for all values of x, then the value of f(8) - f(2) is between which of the following numbers? Not Answered

A) 14 and 24

B) 12 and 24 ✔

C) 12 and 18

D) 8 and 10

49. Which one of the following is the set of critical numbers of $f(x)=\frac{4}{3}x^3+|x|$**?** Not Answered

A) $\left\{\frac{1}{2}\right\}$

B) $\left\{0,\frac{1}{2}\right\}$

C) $\left\{0,-\frac{1}{2}\right\}$

D) $\left\{-\frac{1}{2},0,\frac{1}{2}\right\}$ ✔

50. A tin can of volume 54πcm^3 is to be made in the form of a right circular cylinder that has both flat top and flat bottom. What is the base radius of the tin if it is to be made of the least amount of metal? Not Answered

A) 2cm

B) 3 cm ✔

C) 4 cm

D) 6 cm

51. Air is being pumped into a spherical balloon so that its volume increase at a rate of 50 cm^3/s. How fast is the radius of the balloon increasing when the diameter is 5 cm? Not Answered

A) $\frac{1}{50\pi}$ cm/s

B) $\frac{1}{25\pi}$ cm/s

C) $\frac{5}{\pi}$ cm/s

D) $\frac{2}{\pi}$ cm/s ✔

52. Which one of the following is a valid assertion that can be proved by principle of mathematical induction?

Not Answered

A) the sum of any two positive rational numbers is positive.

B) $r^2 \geq 1$, for every real number r =≥1

C) $n^2 \geq 4n$, for every integer $n \geq 4$ ✔

D) $2^2 \leq 2^2$, for every integer $n \leq 100$

53. Consider the assertion: "The sum of positive irrational numbers is positive irrational number". Which one of the following is correct about the assertion? Not Answered

A)taking irrational numbers such as $\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{6}, \sqrt{7},$ and so on, if we add any two of them, the sum is irrational.

Therefore, the assertion is true.

B) the sum of 1 + √2 and 1 - √2 is 2, which is rational. This is a counter example that disproves the assertion.

C) the sum of √7 and √2 is a counter example that shows the assertion is false.

D) the assertion can be disproved by taking the sum of 1 + √2 and 2 - √2 as a counter example. ✔

54. Suppose "If x ∈ A, then y ∈ B" is a True statement. Then, which one of the following is necessarily true?

Not Answered

A) y ∈ B

B) if x ∉ A, then y ∉ B

C) if y ∈ B, then x ∈ A

D) if y ∉ B. then x ∉ A ✔

55. Let $\vec{A}$ *and* $\vec{B}$ be vectors in space such that $\vec{A}.\vec{B}$= -2 and $\vec{B} = 6\vec{\imath} - 7\vec{\jmath} + \sqrt{15}\,\vec{k}$. If θ is the angle between $\vec{A}$ *and* $\vec{B}$, then what is the value of $|\vec{A}|$?

Not Answered

A) $\frac{1}{5}cos\theta$

B) $\frac{1}{5\,cos\theta}$

C) $-\frac{1}{5}cos\theta$

D) $\frac{-1}{5\cos\theta}$ ✔

56. If P(2, √5, 1) and Q(3, 0, 9) are points on a sphere whose center is on z-axis, then which one of the following point is outside of the sphere? Not Answered

A) (-4, 3, 5)
B) (2, -2, 1)
C) (3, 1, 1) ✔
D) (0, 0, 0)

57. If A(x, 0, 2), B(3, 0, 2) and C(2, √3, 2) are vertices of an equilateral triangle in space, then what is the value of x? Not Answered

A) 5
B) 3
C) 2
D) 1 ✔

58. A patrol boat on a sea sailed from its station 7km to the North; and changed its course and sailed 4√2 km in the direction of 450 South-East. What is the shortest (straight) distance the boat should travel in order to return to its station? Not Answered

A) 5km ✔
B) 7km
C) 5√2km
D) 5+v2km

59. Let $\overrightarrow{PQ}$ be a vector with initial point P= (1, 5) and terminal point Q= (4, 0). If $\vec{v} = x\vec{i} + 2\vec{j}$ is parallel to $\overrightarrow{PQ}$, then what is the value of x? Not Answered

A) -6/5 ✔
B) -2/5
C) -3
D) 3

60. For two non-zero vectors $\vec{a}$ and $\vec{b}$ if $\|\vec{a}+\vec{b}\| = \|\vec{a}\|$ which of the following is true? Not Answered

A) $2\vec{a}.\vec{b} = \vec{b}.\vec{b}$
B) $2\vec{a}+\vec{b}$ and $\vec{b}$ are perpendicular ✔

C) $2\vec{a}+\vec{b}$ and $2\vec{a}+\vec{b}$ are not parallel

D) $\vec{a}.\vec{b}-\vec{b}.\vec{b}=0$

61. A line given by the vector equation (x, y)=(-t, 6+2t), t ∈ ℜ, is tangent to a circle at a point (1, 4). What is the radius of the circle if its center is on the y-axis? Not Answered

A) √5
B) 1/2 √5✔
C) 2√5
D) √10

62. What is the translation vector u=(h, k) so that the equation $x^2 + 2y^2 + 6x - 8y + 15 = 0$ is transformed to an equation of the form $x^2 + 2y^2 + d = 0$, where d is constant? Not Answered

A) u = (-3, 2)
B) u = (3, -2)✔
C) u = (-2, 3)
D) u = (2, -3)

63. If cotθ = √8 and θ is first quadrant angle, then what is the value of cscθ? Not Answered

A) 1/3
B) 3✔
C) √8/3
D) 1/√8

64. If θ = arctan(2), then what is the value of sin(2θ)? Not Answered

A) 2/5
B) 4/5✔
C) 4/√5
D) 2/√5

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

A) the amplitude of f(x) = sin 3x is 3
B) the period of f(x) = 2sin 4x is π
C) the period of f(x) = 3cos(0.5 x-π/3) is 4π✔
D) the amplitude of f(x) = -5 cos (3x + 2)-2 is 7

Your Answers

you have scored 0 out of 0

Answer Key

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

Retake Exam (exam.php?subject=Mathematics&year=2009)

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