NATIONAL EDUCATIONAL ASSESMENT AND EXAMINATIONS AGENCY (NEAEA)
ETHIOPIAN UNIVERSITY ENTRANCE EXAMINATION (EUEE)
MATHEMATICS EXAMINTION 2006

BOOKLET CODE: 00
NUMBER OF ITEMS:

SUBJECT CODE: 00
TIME ALLOWED: 00

1. A water tank is a circular cylinder with base radius 2m and height 3m. If the tank is empty and water is pumped into it at rate of $2m^3$/min, how long does it take for the tank to be full? Not Answered

- A) 1.5 min
- B) 3/2 πmin
- C) 6π✔
- D) 12 min

2. If $A=\begin{pmatrix}2 & 0 & -1\\ 1 & 2 & 0\\ 0 & 0 & -1\end{pmatrix}$ **and** $(2A+B)^T = A^TA$**, then which one of the following is equal to B?** Not Answered

- A) $\begin{pmatrix}1 & 0 & -2\\ 2 & 0 & 0\\ 0 & 0 & 4\end{pmatrix}$
- B) $\begin{pmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{pmatrix}$
- C) $\begin{pmatrix}8 & 0 & -4\\ 4 & 8 & 0\\ 0 & 0 & -4\end{pmatrix}$
- D) $\begin{pmatrix}1 & 2 & 0\\ 0 & 0 & 0\\ -2 & 0 & 4\end{pmatrix}$ ✔

3. Which one of the following represents a geometric sequence? Not Answered

- A) 3, 1, 1/3, 1/9, 1/27,?✔
- B) 1/2, -1/3, 1/4, -1/5, 1/6,?
- C) 1,3, 6, 10, 15,?
- D) -3, 6, -9, 12, -15,?

4. The sequence $\left\{\frac{(n-1)(2n+1)}{1-n^2}\right\}_{n=1}^{\infty}$ **converges to:** Not Answered

- A) -∞
- B) -2✔
- C) 0
- D) 1

5. If F(x) is an ant derivative of f(x)= 1- 2/x^2 and F(1) = 0, then F(2) is equal to: Not Answered

- A) 0✔
- B) 1/2
- C) -1/2
- D) 3

6. Which one of the following expression is a polynomial expression? Not Answered

- A) x^2 - 3x + sinx
- B) $\frac{4x^3+12x^2-x}{\pi x^2}$
- C) $\frac{2+\pi}{1+\pi^2}$ ✔
- D) $2-3x^{\frac{2}{3}}+7x^{\frac{5}{2}}+3x^{-1}$

7. What is the distance from the origin to the line that passes through (1, 0) and (0, 1)? Not Answered

- A) 1/2 √2✔
- B) 1
- C) 1/2
- D) √2

8. If the list of a measurement is 10, α, 5, α,5, 10, 20, 15,20,5 with mean a then α in terms of a is equal to: Not Answered

- A) 10a-90
- B) 9a-90
- C) 5a-90
- D) 5a-45✔

9. The total cost (in Birr) of producing x iron sheets per day is C(x) = 1,000 + 100x - 0.5x^2, 0 ≤ x ≤ 100. What is the marginal (rate of change of) cost at a production level of 80 iron sheets? Not Answered

- A) 8.5
- B) 20✔
- C) 1,800
- D) 5,800

10. If z = x + yi is a complex number, then $|z|^2 + \frac{1}{2}(z - \bar{z})^2 = 1$ is equivalent to which one of the following equations? Not Answered

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

11. The following is the frequency distribution of a grouped data.

Class Intervals	Frequency (f)
3-7	2
8-12	2
13-17	10
18-22	6

What is the mean and standard deviation of the distribution, respectively? Not Answered

- A) $15, 2\sqrt{5}$ ✔
- B) $15, \sqrt{7.5}$
- C) $12.5, 5\sqrt{2}$
- D) $12.5, \sqrt{15}$

12. If $(p \vee q) \Rightarrow (\neg r \wedge r)$ is true, then which one of the following is necessarily true? Not Answered

- A) $((p \vee r) \Rightarrow q$
- B) $\neg p \wedge r$
- C) $\neg p \Rightarrow r$
- D) $\neg p \vee r$ ✔

13. What is the actual value of the sum $\sum_{n=1}^{\infty} \left(\frac{2^n + 5^n}{10^n}\right)$ Not Answered

- A) 0.325
- B) 1
- C) 5/4 ✔
- D) 37/9

14. If $f(x) = \frac{x+1}{x-1}$ and $f(a) = 5$ then $f(2a)$ is equal to: Not Answered

- A) 2 ✔
- B) 4
- C) 6
- D) 8

15. If $f(x) = \sqrt[3]{1 + e^{-x}}$, which of the following is equal to $f^{-1}(x)$? Not Answered

- A) $\ln\left(\frac{1}{x^3-1}\right)$ ✔
- B) $\frac{1}{\ln(x^3-1)}$
- C) $\ln(1 - x^3)$
- D) $(1 + e^{-x})^3$

16. What is the equation of the directrix for the parabola whose equation is $y^2 + 8x + 6y + 25 = 0$?

Not Answered

- A) y = 3
- B) x = 2
- C) x = 0 ✔
- D) x = 4

17. Given that $\lim_{x\to 3} f(x) = 5$ and $\lim_{x\to 3} g(x) = 11$, what is the value of $\lim_{x\to 3}\left(\frac{(f(x)-g(x))(g(x))}{g(x)^2-f(x)^2}\right)^n$?

Not Answered

- A) -66/96
- B) -1/16 ✔
- C) 0
- D) does not exist

18. If $f(x) = \frac{x^2}{1+xg(x)}$, g(2) = 1 and g(2) = 10, then which one of the following is equal to f'(2)(the derivative of f at 2)? Not Answered

- A) -8 ✔
- B) -8/9
- C) 4/3
- D) 8/9

19. If $w = \frac{16i}{1+i} + (1 - 3i)^2$ and $z = |w| + \bar{w}$, which one of the following is the simplest form of z?

Not Answered

- A) √2 + 2i
- B) 2 + 2i
- C) 4 - 2i
- D) 2 - 2i ✔

20. If $M = \begin{pmatrix} 0 & 1 & 2 \\ 3 & -1 & 0 \\ 5 & 2 & 4 \end{pmatrix}$ and $A^T M = 21$, where A is a 3 x 3 matrix and I is the identity matrix of order 3, then what is det(A)? Not Answered

A) 0.2

B) 4/17

C) 0.8✔

D) 1/17

21. If distinct codes (words of eight letters are formed by rearranging the letters in the word'ABBEBAYE', how many of the codes begin with B or Y? Not Answered

A) 840✔

B) 630

C) 1680

D) 420

22. What should be the value of k so that the system of equation $\begin{cases} x-y+z=1 \\ -x+5y-4z=1 \\ 2x+2y-z=k \end{cases}$ **has a solution?**

Not Answered

A)0

B) 1

C) -4

D) 4✔

23. Let $f(x)=\begin{cases} a\frac{sinx}{x-|x|} & if\ x<0 \\ e^{-x}+cosx, & if\ x\geq 0 \end{cases}$ **if f is continuous at x = 0, then what is the value of a?**

Not Answered

A) 4✔

B) 2

C) 1/2

D) -4

24. What is the area of the region between the graphs of $y = -x^2 + 2$ and $y=|x|$, where $-1 \leq x \leq 2$? Not Answered

A) 11/6

B) 25/6✔

C) 7/3

D) 11/3

25. What is the derivative of $f(x)=\int_0^{x^2+\pi}\frac{dt}{sint+1}$ **?** Not Answered

A) $\frac{cosx}{sin(x^2+\pi)+1}$

B) $\frac{2x}{sin(x^2+\pi)+1}$ ✔

C) $\frac{2xcox}{sin(x^2+\pi)+1}$

D) $\int_0^{2x} \frac{dt}{sint+1}$

26. If two lines y=x and y= x - 4 are tangent to a circle at (2, 2) and (4, 0), respectively, then what is the equation of the circle? Not Answered

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

B) $(x - 4)^2 + (y - 2)^2 = 4$

C) $(x - 3)^2 + (y - 1)^2 = 2$ ✔

D) $(x - 1)^2 + (y + 1)^2 = 10$

27. Which one of the following is the set of all critical numbers of $f(x) = \frac{1}{3}x^3 - |4x - 1|$ **?** Not Answered

A) {1/4, 2} ✔

B) {-2, 1/4, 2}

C) {-2, 2}

D) {1/4}

28. Which one of the following is equal to $\int_0^{\frac{\pi}{2}} \frac{x-sinx}{secx}\,dx$ **?** Not Answered

A) $\frac{\pi-3}{2}$ ✔

B) $\frac{\pi-1}{2}$

C) $\frac{3-\pi}{2}$

D) $\frac{\pi+3}{2}$

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

A) a polynomial can have infinitely many vertical asymptotes

B) the graph of a rational function can never cross its horizontal asymptote.

C) the graph of $f(x) = \frac{3x-1}{x-1}$ has no horizontal asymptote.

D) the graph of $f(x) = \frac{x^3-x}{x^2-x}$ has no vertical asymptote. ✔

30. The simplified form of the derivative of $f(x) = \frac{1+sinx}{cosx}$ **is** Not Answered

A) secx + tanx

B) $\frac{1+sinx}{cos^2x}$ ✔

C) $\frac{1}{1+tanx}$

D) $\frac{cosx}{sin^2x}$

31. If Qi, Di and Pi are respectively the i^{th} ?quartile, decile and percentile of a data arranged in an increasing order, then which one of the following is necessarily true? Not Answered

A) $Q_2 = \frac{Q_1+Q_3}{2}$

B) $D_3 > P_{25}$ ✔

C) $P_{25} > Q_1$

D) Q_2 = mean of the data

32. If  **, what is the slope of the tangent line to the graph of f at x=2?** Not Answered

A) -4

B) 2

C) 18

D) 17 ✔

33. If f(x) =e^{2x} sinx, then f''(x) is equal to Not Answered

A) $3e^{2x}$ sinx - $4e^{2x}$ cosx

B) $4e^{2x}$ sinx + $2e^{2x}$ cosx

C) e^{2x} (3sinx + 4cosx) ✔

D) e^{2x} (4sinx - 3sinx)

34. If the equation $(x - 2)^2 - (y - 2)^2 = 1$ represents a hyperbola, which one of the following represents equation of an asymptote to the hyperbola? Not Answered

A) y = 4 - x ✔

B) x + y = 1

C) x = 2 - y

D) x + 2y = 3

35. What is the sum of the series $\sum_{n=1}^{\infty}(-1)^n 3^{-2n}$? Not Answered

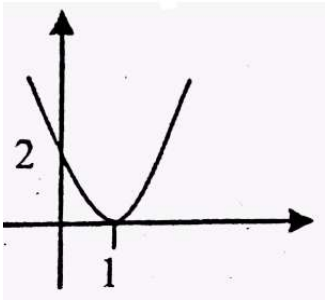
A) -1/8

B) -0.13

C) -0.1 ✔

D) 1/8

36. Which of the equations below is represented by the following parabola?



Not Answered

A) $y=x^2+2$

B) $y=(2x-1)^2$

C) $y=2(x-1)^2$ ✔

D) $y=(2x+1)^2$

37. A company produced 25,000 bulbs and randomly tested 2% of the product. Among the tested bulbs, if 40 have defect of type D_1, 60 have defect of type D_2 and 25 have both types of defects, what is the probability that a bulb produced by the company had none of the defects? Not Answered

A) 0.95

B) 0.80

C) 0.85 ✔

D) 0.20

38. A semi-elliptical arc over a tunnel for a road through a mountain has a major axis of length 80 meters and a height of 30 meters at the center. What is the equation of the semi-elliptical arc over the tunnel, if the center is considered as the origin? Not Answered

A) $\frac{x^2}{6400}+\frac{y^2}{900}=1$

B) $\frac{x^2}{1600}+\frac{y^2}{900}=1$ ✔

C) $\frac{x^2}{900}+\frac{y^2}{6400}=1$

D) $\frac{x^2}{8100}+\frac{y^2}{6400}=1$

39. Suppose AX=b, where A is a 3 x 3 matrix, $b=(b_1, b_2, b_3)^T$ and $X=(x, y, z)^T$. Which one of the following is necessarily true about this system of linear equations? Not Answered

A) The system has a solution only when det(A)≠0.

B) the Cramer?s rule is suitable to solve the system if two rows of A are identical

C) if det(A)≠0 and the second column of A is a multiple of b, then x = 0 ✔

D) if b = 0, then $x=(0, 0, 0)^T$ is the only solution of the system.

40. If $y=\sin(3x^2)$, then the simplified form of $\frac{d^2y}{dx^2}$ is : Not Answered

A) $-6\sin(3x^2)$

B) $\cos(6x)-6\sin(3x^2)$

C) $6\cos(3x^2)+36x2\sin(3x^2)$ ✔

D) $x^2\cos(3x^2)+6\sin(3x^2)$

41. If S is a set with 10 elements and A ⊆ S, what is the probability that A has 3 or more elements? Not Answered

A) 7/10

B) 8/11

C) 121/128✔

D) 7/128

42. If $a_{n=}\left(\frac{n+3}{n+1}\right)^{n}$, then the limit of the sequence $\{a_n\}_{n=1}^{\infty}$ is equal to : Not Answered

A) 1

B) 1/2 e

C) e^2✔

D) $+\infty$

43. Which one of the following is equal to $\lim_{x\to\infty}\left(\frac{x}{x+2}\right)^{-3x}$ **?** Not Answered

A) e^6✔

B) e^{-3}

C) $e^{-3/2}$

D) e^{-6}

44. If a box with square base open top is made from 1,200cm^2 material, what is the largest volume of the box in cm^3 ? Not Answered

A) 4000✔

B) 8000

C) 15,000

D) 3000

45. Which one of the following is true about the graph of $f(x)=\frac{x^2-1}{x-x^2}$ **?** Not Answered

A) x = 0 and x = 1 are its vertical asymptotes.

B) y = 1 is tis horizontal asymptote

C) y = x - 1 is its oblique asymptote

D) it is almost the same as the horizontal line y = -1 as x → ±∞✔

46. Which one of the following is a valid logical argument? Not Answered

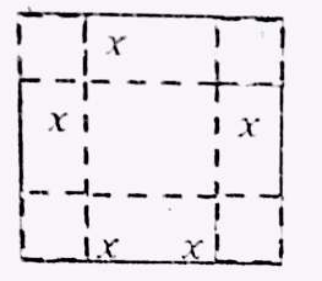
A) p ⇒ q, q ⊢ p

B) p⇔q, p⇒ q ⊢q

C) ¬ p ∧ q, q ⇒ r ⊢ r✔

D) ¬ p, p ∨ q, r ⇒ q ⊢ r

47. Suppose that equal squares are cut from each of the four corners of a square cardboard whose sides are 72 centimetres long. [see the figure below.] The resulting flaps are then folded up to form a box without a top. How long should be each of the four squares that has to be cut off to maximize the volume of the box?



Not Answered

- A) 6cm
- B) 12cm✔
- C) 15cm
- D) 24cm

48. What is the area of the region between the graph of $f(x) = -x^2 + 4x - 3$ and the x axis from x = 0 to x = 3?

Not Answered

- A) -2/3
- B) 2/3
- C) 4/3
- D) 8/3✔

49. Which one of the following is equal to $\int \frac{x+\ln(x+1)}{(x+1)^2} dx$? Not Answered

- A) $\ln(x+1)+\frac{x}{x+1}+c$
- B) $(x+1)^2\frac{1}{x+1}+c$
- C) $(x+1)^2-\frac{x}{x+1}+c$
- D) $\frac{x\ln(x+1)}{x+1}+c$ ✔

50. If $F(x)=f(2x+2)\,g(1-x^2)$, with f(2)= -3, f'(2) = 4, g(1)= -5, and g(1) = -5, then what is the actual value of F'(0)? Not Answered

- A) -40
- B) -20✔
- C) 0
- D) 19

51. Suppose that an airplane is descending at a speed of 50 miles per hour at an angle of 30^0 below the horizontal line. What is the x and y components, respectively of the velocity of the plane in terms of mile?

Not Answered

- A) $25\sqrt{3}$, 25✔
- B) -25, $50\sqrt{3}$

C) 25, -25√3

D) -25√3, -25

52. If a point (2, 5) is reflected under a line to the point(-3, 1), what is the line of reflection? Not Answered

A) 2x + 3y= 7

B) x + 3y= 7

C) 8y + 10x= 19✔

D) 2x + 3y + 5= 0

53. Let the equation $x^2 + 2x + y^2 = 8$ represents a circle. Then which one of the following lines cut the circle at exactly two points? Not Answered

A) 4x + 3y + 19 = 0

B) 3x + 4y + 14 = 0✔

C) 2y= 5x + 43

D) 2x =y - 50

54. Suppose $\vec{A} = 2\vec{\imath} - \vec{\jmath} + 2\vec{k}$ *and* $\vec{B}$ is a vector in space such that $|\vec{B}| = \vec{A}.\vec{B}$ if $\vec{u}$ is the unit vector in the direction of $\vec{B}$, then $|\vec{A} + \vec{u}|^2$ is equal to Not Answered

A) 16✔

B) 12

C) 10

D) 14

55. If A= (-2, 3), B= (3, 1) and C is any other point on the plane, then which one of the following is the coordinate form of $\overrightarrow{AC} - \overrightarrow{BC}$? Not Answered

A) (-5, 2)

B) (5, -2)✔

C) (1, 4)

D) (-1, -4)

56. What is the equation of a line that passes through the point (-1, -2) and parallel to the vector (1, -1)? Not Answered

A) 2x - y= 1

B) x + y - 1 = 0✔

C) x - 2y = 3

D) y - 2x + 1 = 0

57. Suppose P and Q are point in space such that the midpoint of PQ is on the negative z-axis and the distance between P and Q is 6. If P=(2, -1, 0), then what is the coordinate of Q? Not Answered

A) (-2, 1, 4)

B) (2, -1, 6)

C) (2, -1, -6)

D) (-2, 1, -4)✔

58. Which one of the following is equivalent to $\neg\,[(\forall x)(p(x) \Rightarrow Q(x))]$? Not Answered

A) $(\forall x)(\neg p(x) \Rightarrow \neg q(x))$

B) $(\exists x)(\neg p(x) \Rightarrow \neg q(x))$

C) $(\exists x)(\neg p(x) \wedge q(x))$

D) $(\exists x)(p(x) \wedge \neg q(x))$ ✔

59. An observer on level ground is at a distance $10\sqrt{3}$ m form a building. The angles of elevation to the bottom of the windows on the second and third floors are 30^0 and 60^0, respectively. What is the distance h between the bottoms of the windows?
[you may use the values: $\sin 30^0 = \cos 60^0 = 1/2$ and $\sin 60^0 = \cos 30^0 = \sqrt{3}/2$] Not Answered

A) 15m

B) 20m✔

C) $15\sqrt{3}$ m

D) 32m

60. The following is an assertion of a person and his proof. ?For any natural numbers n, $n! < 10^n$.
Proof:
Step 1 let n=1 Since $1! = 1$ and $10^1 = 10$, it is true that $1! < 10^1$
step 2 let n=2, Since $2! = 2$ and $10^2 = 100$, it is true that $2! < 10^2$
step 3 let n=3, Since $3! = 6$ and $10^3 = 1000$, it is true that $2!\ 10^2$
step 4 continuing in this manner , we can see that whenever $k! < 10^k$ is true, then $(k + 1)! < 10^{k+1}$ is also true.
Therefore, by induction, $n! < 10^n$ for all natural numbers.?
Which one of the following is true about the proof? Not Answered

A) The proof is correct by the principle of mathematical induction, though Step 2 and Step 3 can be omitted.✔

B) The proof is correct by the principle of mathematical induction; through Step 2 and Step 3 are necessary since they provide additional information.

C) The proof is invalid because Step 4 did not justify the desired induction step.

D) The proof follows the technique of a proof by exhaustion.

61. What is the image of the line given by (x, y) = (-1, 0) + t(3, 6), t ∈ R, under the transition that takes (1, 0) to (0, 1) following by the reflection about the line y = 2x? Not Answered

A) y = 2x + 3

B) y= 2x - 3

C) y = 2x + 6

D) y = 2x - 5✔

62. If θ = 2 arctan (1/2), then which one of the following is equal to sec(θ)? Not Answered

A) 35/3

B) 4/5

C) 5/3✔

D) 5/4

63. If a translation T takes the circle $x^2 + y^2 - 2x + 6y + 3 = 0$ into the circle whose equation is $(x + 2)^2 + (y - 4)^2 = 7$, then what is the image of the origin under T? Not Answered

A) (-3, 7)✔

B) (1, 2)

C) (1, -3)

D) (-2, 4)

64. If L is the line passing through (0, 2) & parallel to $\vec{v} = \vec{i} + 3\vec{j}$. Which one of the following is true about L and the circle $(x - 2)^2 + (y - 1)^2 = 5$? Not Answered

A) L is tangent to the circle at (0, 2)

B) L is tangent to the circle at some point P, where P ≠ (0, 2).

C) L intersects the circle at two distinct points.✔

D) the distance between L and the centre of the circle is greater than ≠5

65. Suppose $\vec{A} = 3\vec{\imath} - 4\vec{j}$ and $\vec{B}$ is a vector in the xy- plane such that the angle between $\vec{A}$ and $\vec{B}$ is $\frac{\pi}{3}$, if $\vec{u}$ is the unit vector in the direction of $\vec{B}$, then $\vec{A}.(\vec{A} - 2\vec{u})$ is equal to:

Not Answered

A) 20✔

B) 5

C) 15

D) 30

Your Answers

you have scored 0 out of 0

Answer Key

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

Retake Exam (exam.php?subject=Mathematics&year=2006)