Basic Mathematics Aptitude Test

(Full score: 40)

Please Note:

- You have 60 minutes to complete.
- No calculators are allowed.
- Please show all your work and write your answers in the designated space.

Thank you.

Country:_____

Reference Number:_____

Name:_____

Name:

Reference Number:

In each question below, choose the correct answer from A-E (2 points for each question):

1. Calculate $11 - (-6)^3 \div (-2)^2$.

Answer:

2. Calculate $\frac{(x-2)^5}{(3x-6)^4}$ for $x = 2756$.

Answer:

3. Calculate $\frac{\sqrt{3}}{3+2\sqrt{2}} + \frac{\sqrt{3}}{3-2\sqrt{2}}$.

Answer:

Name:

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4. Solve for x and y in the following system of equations.

$$-0.5x + 0.4y = -\frac{7}{15}$$
$$\frac{1}{3}x + 0.25y = 1$$

Answer:

5. Solve for *x* in the following equation.

$$4x^{-0.25} = 12$$

Answer:

Name:

Reference Number:

6. Solve for *x* in the following equation.

$$2\log_3(x+13) - \log_3(-2x+1) = 2$$

Answer:

7. Find the largest integer x that satisfies $|2 - \log_3 x| < 3$.

Answer:

8. Evaluate the following sum.

$$\sum_{t=1}^{\infty} t(0.5)^t$$

Answer:

Name:

Reference Number:

9. Find the equation of a line that is tangential to $y = -2(x-1)^3 + 1$ at $(x, y) = (2, -1)$.

Answer:

10. Find the first derivative of $f(x) = (2x-1)(3x^2 + x - 2)$.

Answer:

11. Evaluate the second derivative of $f(x) = 2e^{-2x+2} + \ln(3x+1)$ at $x = 1$.

Answer:

Name:

Reference Number:

12. Find the cross partial derivative $\frac{\partial^2 f(x,y)}{\partial x \partial y}$ of $f(x,y) = x\ln(2x+y)$.

Answer:

13. Evaluate the integral $\int_{-1}^{5}(x^2 - 2x + 3)dx$.

Answer:

14. Evaluate the integral $\int_{-2}^{0} e^{-2x}dx$, where e denotes Euler's constant.

Answer:

Name:

Reference Number:

15. Given matrices **A** and **B** below, find the matrix **X** that satisfies $\mathbf{AX} = \mathbf{B}$.

$$\mathbf{A} = \begin{bmatrix} 2 & -1 \\ -2 & 3 \end{bmatrix},\ \mathbf{B} = \begin{bmatrix} 5 & 4 \\ -3 & -8 \end{bmatrix}.$$

Answer: _____

16. Solve for $x_1, x_2,$ and x_3, where

$$\begin{bmatrix} 2 & -3 & -1 \\ -1 & 5 & 2 \\ 1 & -1 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -4 \\ 3 \\ 8 \end{bmatrix}.$$

Answer: _____

Name:

Reference Number:

17. Find the values of *x* and *y* that solve the following problem.

maximize $\ln(x+8)+2\ln(2y-5)$

subject to $x+4y=8$

Answer:

18. Find the values of *x* and *y* that solve the following problem.

maximize $3\ln(x-2)+y$

subject to $2x+y=10,\ x\geq 4,\ y\geq -6$

Answer:

Name:

Reference Number:

19. Suppose you roll two fair dice. What is the probability that the sum of two numbers is at least 8?

Answer:

20. Suppose you randomly pick an integer from 500 to 999. What is the probability that the integer you picked is divisible by both 4 and 6?

Answer: