

MATH 110 Sample 01 Exam 2

For each problem, show your work in the space provided.
Write your Final Answer (and the letter answer) on the Answer Sheet provided.

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1. Write the equation $4^{3/2} = 8$ in logarithmic form.

[A] $\log_4 8 = \frac{3}{2}$

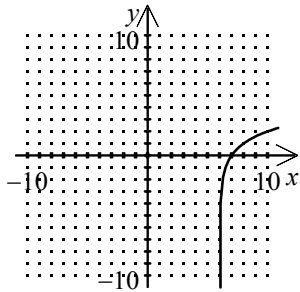
[B] $\log_8 4 = \frac{2}{3}$

[C] $2\log_3 8 = 4$

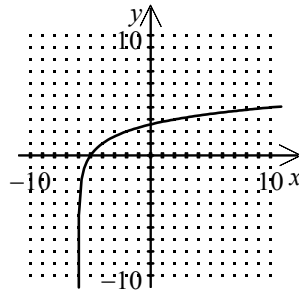
[D] $\log_{3/2} 8 = 4$

2. Graph: $y = \log_2(x + 6)$

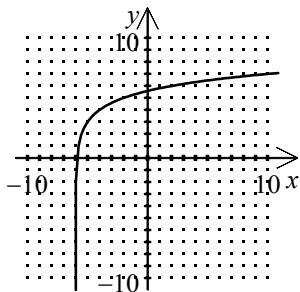
[A]



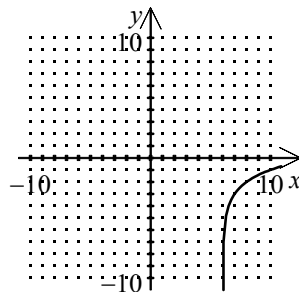
[B]



[C]



[D]



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3. Evaluate: $\log_7\left(\frac{1}{49}\right)$ [A] 3 [B] -2 [C] 2 [D] -3

4. Write the following as the logarithm of a single expression. Assume that variables represent positive numbers.

$$\log_{11} 10 + \log_{11}(x+2) + \log_{11}(y+4)$$

5. Write as the logarithm of a single expression: $\log_c 5x + 5(\log_c x - \log_c y)$

[A] $\log_c \frac{5x^6}{y^5}$ [B] $\log_c \frac{10x}{5y}$ [C] $\log_c \frac{25x^2}{y}$ [D] none of these

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6. Evaluate: $\ln\left(\frac{1}{\sqrt[3]{e}}\right)$ [A] $-\frac{1}{7}$ [B] 7 [C] $\frac{1}{7}$ [D] -7

7. Solve for x correct to four decimal places: $e^{-7x} = 1.8$
[A] -0.0365 [B] -0.0840 [C] 0.0016 [D] 7.5878

Solve:

8. $\log_x \frac{4}{81} = -2$

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Solve:

9. $3x^2 + 10x = 8$ [A] $\left\{-4, \frac{3}{2}\right\}$ [B] $\left\{4, -\frac{3}{2}\right\}$ [C] $\left\{4, -\frac{2}{3}\right\}$ [D] $\left\{-4, \frac{2}{3}\right\}$

10. $12x^{-2} + 7x^{-1} + 1 = 0$

[A] no solution

[B] $x = 3, x = 4$

[C] $x = -3, x = -4$

[D] $x = -\frac{1}{3}, x = -\frac{1}{4}$

11. $\sqrt[4]{x^2 + 4x - 3} = \sqrt[4]{3x + 9}$ [A] $-\frac{7}{2}, \frac{7}{2}$ [B] $-4, \frac{7}{2}$ [C] $-\frac{7}{2}, 3$ [D] $-4, 3$

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Solve:

12. $x^2 + y^2 = 4$

$$x + y = 2$$

[A] $\{(2, -2), (-2, -2)\}$

[B] $\{(0, -2), (-2, 0)\}$

[C] $\{(0, 2), (2, 0)\}$

[D] $\{(0, 0), (2, -2)\}$

13. Solve the system:

$$x^2 + y^2 = 144$$

$$x^2 - 4y^2 = 64$$

[A] $(8\sqrt{2}, 4), (8\sqrt{2}, -4)$

[B] $(8\sqrt{2}, 4), (8\sqrt{2}, -4)$

$(-8\sqrt{2}, 4), (-8\sqrt{2}, -4)$

[C] $(1, \sqrt{143}), (1, -\sqrt{143})$

[D] $(-8\sqrt{2}, 4), (-8\sqrt{2}, -4)$

$(-1, \sqrt{143}), (-1, -\sqrt{143})$

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14. Solve: $x^2 - 7x \geq 18$

[A] $-2 \leq x \leq 9$ [B] $x \leq -2$ or $x \geq 9$ [C] $-9 \leq x \leq 2$ [D] $x \leq -9$ or $x \geq 2$

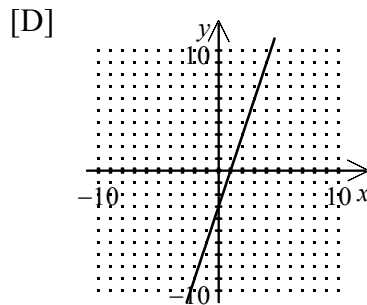
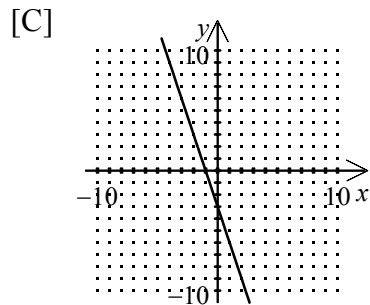
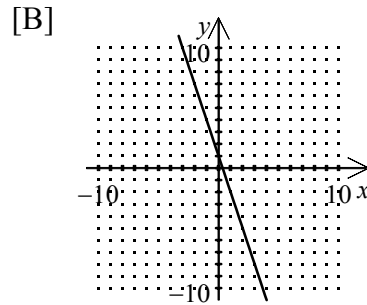
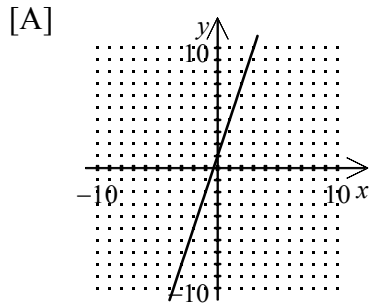
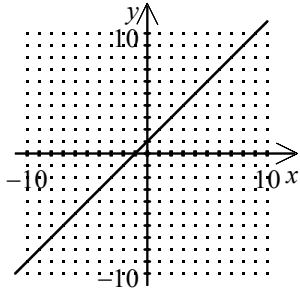
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15. Given the graph of $y = x + 1$, determine the graph of $y = -3(x + 1)$.



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16. Locate the asymptotes and graph the rational function $f(x) = -\frac{5}{x^2 - 16}$.

17. Find all the real and complex zeros of the polynomial $x^4 - 8x^3 + 8x^2 + 72x - 153$.

[A] 4, -4, $3 - i$, $3 + i$

[B] 3, -3, $4 - 2i$, $4 + 2i$

[C] 4, -4, $3 - 2i$, $3 + 2i$

[D] none of these

18. List all of the potential rational zeros of the polynomial function. Do not attempt to find the zeros. $f(x) = 2x^3 - 7x^2 - 2x - 12$

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19. Graph the parabola: $y = (x+1)^2 - 3$

20. Find an equation for the parabola with focus at $(-11, 2)$ and vertex at $(1, 2)$.

[A] $y^2 + 4y + 48x + 52 = 0$

[B] $x^2 - 2x + 48y - 40 = 0$

[C] $x^2 - 2x + 48y + 81 = 0$

[D] $y^2 - 4y + 48x - 44 = 0$

21. Write the partial fraction decomposition of $\frac{-4x^2 + 2x - 7}{(x^2 + 3)^2}$.

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22. Tasty Bakery sells three kinds of muffins: chocolate chip muffins at 35 cents each, oatmeal muffins at 40 cents each, and cranberry muffins at 45 cents each. Charles buys some of each kind and chooses twice as many cranberry muffins as chocolate chip muffins. If he spends \$4.50 on 11 muffins, how many cranberry muffins did he buy?

[A] 5

[B] 2

[C] 4

[D] 8

23. Ana has three investments totaling \$80,000. These investments earn interest at 7%, 9%, and 11% respectively. Ana's total income from these investments is \$8000. The income from the 11% investment exceeds the total income from the other two investments by \$3000. Find how much Ana has invested at 7%.

[A] \$10,000

[B] \$49,500

[C] \$20,000

[D] \$50,000

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24. Given $A = \begin{bmatrix} 0 & 4 & 1 \\ -1 & -1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -3 \\ 0 & 1 \\ 4 & -1 \end{bmatrix}$, find AB .

[A] $\begin{bmatrix} 4 & -1 \\ 3 & 2 \end{bmatrix}$

[B] $\begin{bmatrix} 0 & 3 \\ 0 & -1 \\ 0 & 0 \end{bmatrix}$

[C] $\begin{bmatrix} 4 & 3 \\ -1 & 2 \end{bmatrix}$

[D] $\begin{bmatrix} 3 & 7 & 1 \\ -1 & -1 & 0 \\ 1 & 17 & 0 \end{bmatrix}$

25. Find the sum of the geometric series: $25, -5, 1, -\frac{1}{5}, \dots$

[A] $\frac{125}{6}$

[B] $\frac{15,624}{750}$

[C] $\frac{78,124}{3750}$

[D] $\frac{16,374}{750}$

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26. Find the first four terms and the 8th term of the sequence $s(n) = \frac{n(n-1)}{3}$.

[A] $0, \frac{1}{2}, \frac{6}{5}, 2; \frac{56}{11}$

[B] $-\frac{1}{3}, 0, \frac{2}{3}, 2; 14$

[C] $0, 2, 6, 12; 56$

[D] $0, \frac{2}{3}, 2, 4; \frac{56}{3}$

27. There is a drawer with 4 red socks, 10 white socks, and 8 blue socks. You draw out one sock, return it, and draw out a second sock. What is the probability that the first sock is blue and the second is red?

28. How many subsets of two elements are contained in the set $\{a, b, c, d\}$?

[A] 16

[B] 12

[C] 4

[D] 6

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29. How many different ways can 8 different runners finish in first, second, and third places in a race?

30. A single fair die is tossed. Find the probability of obtaining a number greater than 2.

[A] $\frac{2}{3}$

[B] $\frac{1}{6}$

[C] 1

[D] $\frac{5}{6}$

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[1] _____

[2] _____

[3] _____

[4] _____

[5] _____

[6] _____

[7] _____

[8] _____

[9] _____

[10] _____

[11] _____

[12] _____

[13] _____

[14] _____

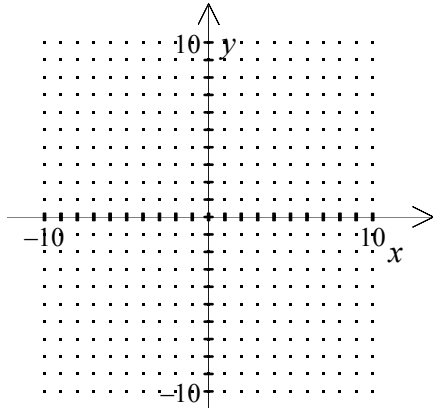
[15] _____

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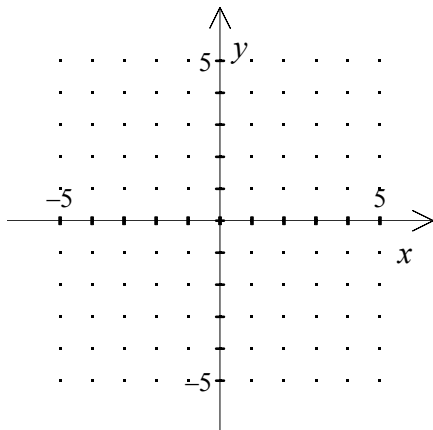
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[16] _____

[17] _____

[18] _____



[19] _____

[20] _____

[21] _____

[22] _____

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[23] _____

[24] _____

[25] _____

[26] _____

[27] _____

[28] _____

[29] _____

[30] _____

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[1] [A] _____

[2] [B] _____

[3] [B] _____

[4] $\log_{11}(10xy + 40x + 20y + 80)$ _____

[5] [A] _____

[6] [A] _____

[7] [B] _____

[8] $\frac{9}{2}$ _____

[9] [D] _____

[10] [C] _____

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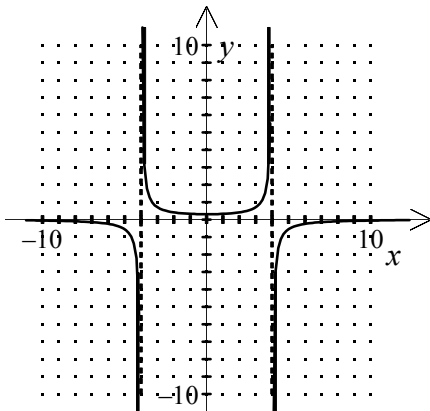
[11] [D] _____

[12] [C] _____

[13] [A] _____

[14] [B] _____

[15] [C] _____



[17] [D] _____

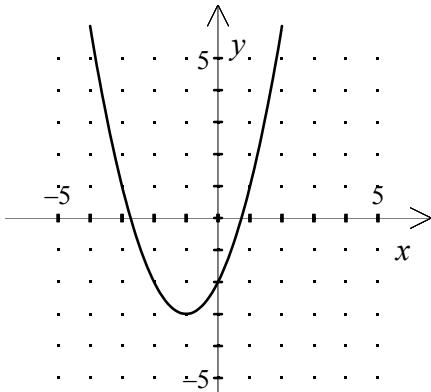
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[18] $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12, \pm \frac{1}{2}, \pm \frac{3}{2}$



[19] _____

[20] [D]

[21] $-\frac{4}{x^2+3} + \frac{2x+5}{(x^2+3)^2}$

[22] [C]

[23] [A]

[24] [C]

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[25] [A] _____

[26] [D] _____

[27] $\frac{8}{121}$ _____

[28] [D] _____

[29] ${}_8P_3 = 336$ _____

[30] [A] _____