Academic Algebra II 1st Semester Exam Mr. Pleacher Name _____

I. Multiple Choice

_____ 1. The expression $10x - x^2$ is greater than zero for all values of x that are
(A) greater than 0 (C) greater than 10
(B) less than 0 but greater than 10 (D) greater than 0 but less than 10

_____ 2. If the discriminant of a quadratic equation with real coefficients is *not* negative, then the roots of the equation must be
(A) rational (B) irrational (C) real (D) imaginary

_____ 3. Which is a factor of $b^3 - 10b^2 + 24b$?
(A) $b - 2$ (B) $b - 4$ (C) $b + 6$ (D) $b + 12$

_____ 4. The graph of the equation $y = -2x + 5$ does *not* pass through the point whose coordinates are
(A) (1, 3) (B) (-1, 7) (C) (3, 1) (D) (½, 4)

_____ 5. The function $f(x) = x - x^2$ has its maximum value when
(A) $x = 1$ (B) $x = -1$ (C) $x = ½$ (D) $x = 0$

_____ 6. If x = 8, what is the value of $3x^0 - 2x^{-\frac{1}{3}}$
(A) ¾ (B) 2 (C) $2\frac{3}{4}$ (D) 0

_____ 7. A solution of the equation $x^2 - 4 = 0$ is
(A) 0 (B) –2 (C) – 4 (D) 4

_____ 8. What are the sum (S) and the product (P) of the roots of the equation $x^2 + x + 2 = 0$?
(A) S = 1, P = 2 (C) S = 2, P = -1
(B) S = 2, P = 1 (D) S = -1, P = 2

_____ 9. What is the solution of the equation $2x^2 - 10 = 0$?
(A) $\sqrt{5}$ and $-\sqrt{5}$ (C) $\sqrt{10}$ and $-\sqrt{10}$
(B) 5 and -5 (D) 10 and -10

_____ 10. The slope of a line which is perpendicular to the line that passes through the points (3, 1) and (3, 5) is
(A) undefined (B) 0 (C) 3 (D) -3

II. Short Answer

_____ 11. The additive inverse of $3x$ is __.

_____ 12. Find the value of x for which the expression $\frac{2}{x-4}$ is undefined.

_____ 13. What is the slope of a line whose equation is $y = 7$?

_____ 14. Which fraction is equivalent to $0.121\overline{212}$?

_____ 15. Which property is illustrated? $3(4 + 5) = 3(4) + 3(5)$

_____ 16. Use <, =, or > to compare the numbers: -2.5 ___ -2.1

_____ 17. Evaluate the expression $2 \bullet 5^2 + 6 \bullet 4$

_____ 18. Evaluate the expression $\frac{4 + 5 \bullet 3}{6 - 4}$

_____ 19. Solve for y: $7y + 2(y - 8) = 11$

_____ 20. Solve for x: $8x + 1 = 6x - 13$

III. Free Response. SHOW ALL WORK!

_____ 21. Solve the equation $2x^2 - 5x - 4 = 0$ and leave the answer in simplest *radical* form.

_____ 22. Solve the following system of equations for x, y, and z.

$$\begin{aligned} 4x + 2y + z &= 7 \\ x - y + 6z &= -1 \\ 2x + 3y - 5z &= 5 \end{aligned}$$

_____ 23. Find the two binomial factors of $a^3 - 2a^2 + a - 2$

_____ 24. If 250 kilograms of corn are needed to feed 5,000 chickens, how many chickens can be fed with 140 kilograms of corn?

_____ 25. Factor completely: $y^2x - x^3$

_____ 26. Find *three* consecutive integers such that the sum of the first and second is equal to three times the third integer.

_____ 27. Solve the following system of equations: $4x - 3y = 8$
$2x + y = -1$

_____ 28. Factor completely: $6x^2 - 7x - 3$

_____ 29. Find the value of k so that the graph of the equation $5x + 2y = 12$ passes through the point whose coordinates are $(4, k)$.

_____ 30. Write the equation of the line which is parallel to $y = -4x + 3$ and passes through the origin.

IV. Multiple Choice

_____ 31. If $f(x) = |x - 1|$, then $f(-3) =$

(A) - 4 (B) 2 (C) 3 (D) 4

_____ 32. What is the equation of the straight line that passes through the points (-2, 5) and (-6, -3) ?

(A) $2x + 7 = 0$ (C) $x - 2y = -12$
(B) $2x - y = -9$ (D) $5x + 2y = 0$

_____ 33. Which is true for the domain of the function $y = \frac{x^2 - 9}{x - 2}$?

(A) $x \neq -2$ (B) $x \neq 2$ (C) $x \neq 0$ (D) $x \neq 4$

_____ 34. What are the coordinates of the vertex of the parabola whose equation is $y = x^2 + 2x - 11$?

(A) (-1, -12) (B) (1, -8) (C) (-2, -11) (D) (2, -3)

_____ 35. In the system of equations,

$kx + y = 7$ and
$2x - y = 3$,

there is ***no*** solution when ***k*** is equal to

(A) 5 (B) 2 (C) -2 (D) -5

_____ 36. The solution of the equation $|y - 5| = 2$ is

(A) y = 7 (B) y = 3 (C) y = 7 and y = -7 (D) y = 7 and y = 3

_____ 37. A root of the equation $(x-1)^2 - (x-1) = 0$ is

(A) -1 (B) 2 (C) 0 (D) -4

_____ 38. The perimeter of a square is represented by p. What is the area of this square in terms of p?

(A) $\frac{p^2}{16}$ (B) $\frac{p^2}{4}$ (C) $4p^2$ (D) $2p^2$

_____ 39. Which value of x satisfies the inequality $|x| + 2 < 5$?

(A) -5 (B) -2 (C) -3 (D) 4

_____ 40. What is the solution of the inequality $3x + 1 \geq 11 - 2x$?

(A) $x \leq -2$ (B) $x \geq 2$ (C) $x \geq -2$ (D) $x > 0$

_____ 41. Which represents the solution of the inequality $|2x - 1| < 7$?

(A) x < -3 or x > 4 (C) -3 < x < 4
(B) x < -4 or x > 3 (D) -4 < x < 3

_____ 42. Which of the following is **not** a function?

(A) {(1, 2), (-2, 2), (3, 3)}
(B) {(1, 2), (-2, 6), (3, 3)}
(C) {(2, 2), (2, 3), (4, 3)}
(D) {(1, 3), (2, 3), (4, 3)}

_____ 43. If f(x) = 2x – 7 and $g(x) = -4x^2$, which is the function $(f \circ g)(x)$?

(A) $-4(2x-7)^2$ (B) $-8x^3 + 28x^2$
(C) $-8x^2 - 7$ (D) $8x^2 - 7$

_____ 44. The product of a 2x3 matrix and a 3x2 matrix is

(A) a 3x3 matrix (B) a 2x2 matrix (C) a 2x3 matrix
(D) Can not be done

_____ 45. The identity matrix for a 2x2 matrix is:

A. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ B. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ C. $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ D. $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$

_____ 46. Which of the following could be used to find x in this system? $\begin{cases} 3x + 8y = 13 \\ 5x - 3y = 11 \end{cases}$

A. $\dfrac{\begin{vmatrix} 3 & 8 \\ 5 & -3 \end{vmatrix}}{\begin{vmatrix} 13 & 8 \\ 11 & -3 \end{vmatrix}}$ B. $\dfrac{\begin{vmatrix} 13 & 8 \\ 11 & -3 \end{vmatrix}}{\begin{vmatrix} 3 & 8 \\ 5 & -3 \end{vmatrix}}$ C. $\dfrac{\begin{vmatrix} 3 & 13 \\ 5 & 11 \end{vmatrix}}{\begin{vmatrix} 3 & 8 \\ 5 & -3 \end{vmatrix}}$ D. $\dfrac{\begin{vmatrix} 3 & 8 \\ 5 & -3 \end{vmatrix}}{\begin{vmatrix} 3 & 13 \\ 5 & 11 \end{vmatrix}}$

_____ 47. Evaluate the determinant: $\begin{vmatrix} 3 & -7 \\ -4 & 9 \end{vmatrix}$ =

(A) 23 (B) 1 (C) -1 (D) 55

_____ 48. Write in simplest radical form: $\sqrt{40}$ =

A) $10\sqrt{2}$ B) $4\sqrt{5}$ C) $2\sqrt{10}$ D) $4\sqrt{10}$

_____ 49. What must be added to $x^2 + 8x$ to complete the square?

A) 4 B) 8 C) 16 D) 64

_____ 50. Determine the values of a, b, and c for the quadratic equation

$3x^2 - 5x = 6$

A) a = 3 b = 5 c = 6
B) a = 3 b = -5 c = 0
C) a = 3 b = -5 c = -6
D) a = 1 b = 5 c = 6

V. Free Response

_____ 51. What is the equation for the **inverse** of the function $y = -\frac{3}{5}x + 2$?

_____ 52. Given f(x) = -2x and g(x) = 2x – 6, Determine (f + g)(x)

_____ 53. Solve the following system by matrices (but not with the calculator). You must show all work.

$$\begin{cases} 4x - 3y = 14 \\ 3x + y = 4 \end{cases}$$

_____ 54. Determine the inverse matrix of: $\begin{bmatrix} 7 & -4 \\ 5 & -3 \end{bmatrix}$

_____ 55. Subtract the following: $(4x^3 + 3x + 5) - (2x^2 + 4x + 1)$

_____ 56. Multiply the following: $(3a^2 + 4a - 2)(a - 7)$

_____ 57. Write a function of the form $g(x) = (x - h)^2 + k$ whose graph represents a translation of the graph of $f(x) = x^2$ four units to the right and three units down.

_____ 58. Solve by factoring: $3x^2 + 18x + 27 = 0$

_____ 59. Write a quadratic equation that has the solutions $x = -3$ and $x = 5$.

_____ 60. Solve the equation $x^2 + 6x + 5 = 10$ by completing the square.