Algebra II Final Examination Mr. Pleacher Name _____

I. Multiple Choice

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

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

_____ 2. What is the product of the polynomials (4c – 1) and (3c + 5)?

A) $7c - 4$
B) $12c^2 + 17c - 5$
C) $12c^2 + 23c + 5$
D) $7c^2 + 6c - 5$

_____ 3.

What is the total of $\sqrt{245} + \sqrt{125} - \sqrt{80}$?

A) $2\sqrt{5}$
B) $4\sqrt{5}$
C) $8\sqrt{5}$
D) $16\sqrt{5}$

_____ 4. 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)

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

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

_____ 6. 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) $x > 0$

_____ 7. 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) $8x^2 - 7$

_____ 8. 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

_____ 9. 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. $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$

_____ 10. Which is the solution set for $\sqrt{x+10} = 3\sqrt{2x+3}$?

A) $\left\{\frac{1}{5}\right\}$

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

C) $\{-1\}$

D) $\{1\}$

_____ 11. Which expression is equivalent to log ($4m^2$) ?

(A) 8 log (m) (B) log (4) + 2 log (m)

(C) (log 4) (log m) (log m) (D) 2 (log 4 + log m)

_____ 12. Which is the center of the circle $x^2 + y^2 + 4x - 8y + 10 = 0$?

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

_____ 13. Which are the solutions of the system?

$$\begin{cases} 2x^2 + 3y^2 = 17 \\ x^2 + y^2 = 7 \end{cases}$$

I. $\left(2, \sqrt{3}\right)$ II. $\left(2, -\sqrt{3}\right)$ III. $\left(-2, \pm\sqrt{3}\right)$

A. I only B. III only C. I and III only D. I, II, and III

_____ 14. Which of the following represents the quotient of $\left(x^5 - x^4 + 6x^3 - 2x^2 + x - 8\right) \div \left(x - 1\right)$?

A. $x^4 - 2x^3 + 4x^2 + 2x + 3 - \dfrac{5}{x-1}$

B. $x^4 + 6x^2 - 8x - 7 - \dfrac{15}{x-1}$

C. $x^4 + 6x^2 + 6x + 7 - \dfrac{1}{x-1}$

D. $x^4 + 6x^2 + 4x + 5 - \dfrac{3}{x-1}$

_____ 15. Which is equivalent to $\dfrac{\frac{1}{x}-\frac{4}{y}}{\frac{2}{x}+\frac{5}{y}}$?

A) $\dfrac{x-4y}{5x+2y}$

B) $\dfrac{y-4x}{2y+5x}$

C) $\dfrac{x^2y^2}{(y-4x)(2y+5x)}$

D) $2y^2-3xy-20x^2$

_____ 16. Which of the following could be used to perform the synthetic division for

$$(x^2+6x^4-7x^3+3)\div(x+4)$$

A. $4\,\big|\,1\ \ 6\ \ 7\ \ 3$

B. $-4\,\big|\,1\ \ 6\ \ -7\ \ 3$

C. $-4\,\big|\,6\ \ -7\ \ 1\ \ 0\ \ 3$

D. $4\,\big|\,6\ \ -7\ \ 1\ \ 0\ \ 3$

_____ 17. What is the equation for the **inverse** of the function $y=-\dfrac{3}{5}x+2$?

(A) 5x + 3y = 10 (B) 5x – 3y = 10
(C) 5x + 3y = -10 (D) 3y – 5x = 10

_____ 18. Express $\log_3 w = k$ in exponential form

A) $3^w = k$ C) $w^3 = k$

B) $3^k = w$ D) $k^3 = w$

_____ 19. ${}_5C_3 =$

A) 10 B) 30 C) 60 D) 120

_____ 20. ${}_6P_4 =$

A) 10 B) 15 C) 60 D) 360

II. Free Response Leave all answers in simplest radical form or fractional form

_____ 21. Evaluate $\sum_{i=1}^{3}(4i+1)$

_____ 22. Find a_{10} in the sequence 1, 4, 7, 10, …

_____ 23. Determine the sum of the infinite series $10 + 3\frac{1}{3} + 1\frac{1}{9} + \ldots$

_____ 24. Determine the sum of the first 25 positive even integers.

_____ 25. Insert 4 geometric means between 160 and 5.

_____ 26. Determine the sum of the first ten terms of the geometric sequence
15, 30, 60, 120, …

_____ 27. The additive inverse of $3x$ is __.

_____ 28. Find the value of x for which the expression $\frac{2}{x-4}$ is undefined

_____ 29. Which fraction is equivalent to $0.121\overline{212}$?

_____ 30. Which property is illustrated? $3(4 + 5) = 3(4) + 3(5)$

_____ 31. Evaluate the expression $\frac{4+5\bullet 3}{6-4}$

_____ 32. Solve for y: $7y + 2(y - 8) = 11$

_____ 33. Solve the equation $2x^2 - 5x - 4 = 0$ and leave the answer in simplest *radical* form.

_____ 34. Solve the following system of equations for x, y, and z.

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

_____ 35. If 250 kilograms of corn are needed to feed 5,000 chickens, how many chickens can be fed with 140 kilograms of corn?

_____ 36. Factor completely: $y^2x - x^3$

Below 37. Write out the definition of an ellipse.

Below 38. Write the general equation for a circle with center at (h, k) and radius r.

_____ 39. Factor completely: $6x^2 - 7x - 3$

_____ 40. Find the value of k so that the graph of the equation $5x + 2y = 12$ passes through the point whose coordinates are $(4, k)$.

III. Multiple Choice

_____ 41. $f(x) = x^2 - 2x$

$g(x) = x - 3$

Which of the following expressions represents $g(f(x))$?

A) $x^3 - 5x^2 + 6x$

B) $x^2 - 2x - 3$

C) $x^2 - 3x - 3$

D) $x^2 - 8x + 9$

_____ 42. If the domain of $f(x) = 2x^2 - 3$ is limited to $\{-3, -1, 1, 3\}$, What is the range?

A) $\{-21, -5, -1, 15\}$

B) $\{-21, 15\}$

C) $\{-1, 15\}$

D) $\{1, 5, 15, 21\}$

_____ 43. Which is a factor of $b^3 - 10b^2 + 24b$?

(A) b – 2 (B) b – 4 (C) b + 6 (D) b + 12

_____ 44. Which is equivalent to (4 – 2i) (5 + 3i) ?

A) 26
B) 12
C) 14 + 2i
D) 26 + 2i

_____ 45. Which is equivalent to (6 + 2i) – (4 + 3i) ?

A) 2 – i
B) 2 + i
C) 2 + 5i
D) 10 – i

_____ 46. 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

_____ 47. A solution of the equation $x^2 - 4 = 0$ is

(A) 0 (B) –2 (C) – 4 (D) 4

_____ 48. What is the exact value of ln(e) ?

(A) 2 (B) e (C) 10 (D) 1

_____ 49. 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

_____ 50. 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

_____ 51

Which is the solution set for $2x^2 + 2x + 1 = 0$?

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

B) $\left\{\frac{-1}{2} \pm \frac{1}{2}i\right\}$

C) $\left\{\frac{-1}{2} \pm i\right\}$

D) $\{-1 \pm i\}$

_____ 52. Evaluate the determinant: $\begin{vmatrix} 3 & -7 \\ -4 & 9 \end{vmatrix}$ =

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

_____ 53. Write in simplest radical form: $\sqrt{40}$ =

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

_____ 54. What must be added to $x^2 + 8x$ to complete the square?

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

_____ 55. Identify the conic section represented by the equation $x^2 + 6x - 4y = 9$

A. Parabola B. Circle C. Ellipse D. Hyperbola

_____ 56. Identify the conic section represented by the equation

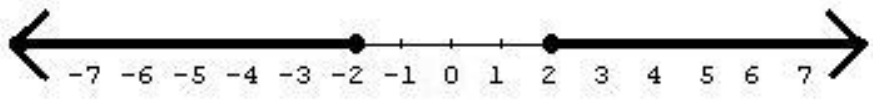
$x^2 + 6x + y^2 - 18y = 9$

A. Parabola B. Circle C. Ellipse D. Hyperbola

_____ 57. The time it takes to travel a certain distance varies inversely as the average rate of travel. Averaging 42 miles per hour, it takes Andrea 5 hours to drive to Roanoke. If it took her 4 hours and 20 minutes to reach Roanoke on her last trip, what was her average rate of travel?

A) 36.4 mi./hr
B) 46.7 mi./hr
C) 48.5 mi./hr
D) 49.4 mi./hr

_____ 58. Which of the following inequalities has the solution indicated on the number line below?



A) $|x| \leq 2$

B) $|x| \geq 2$

C) $|x - 2| \leq 4$

D) $|x + 2| \geq 0$

_____ 59. Which is the solution to the equation $\log_6 x = 5$?

(A) 7776 (B) 30 (C) 15,625
(D) 1 (E) 11

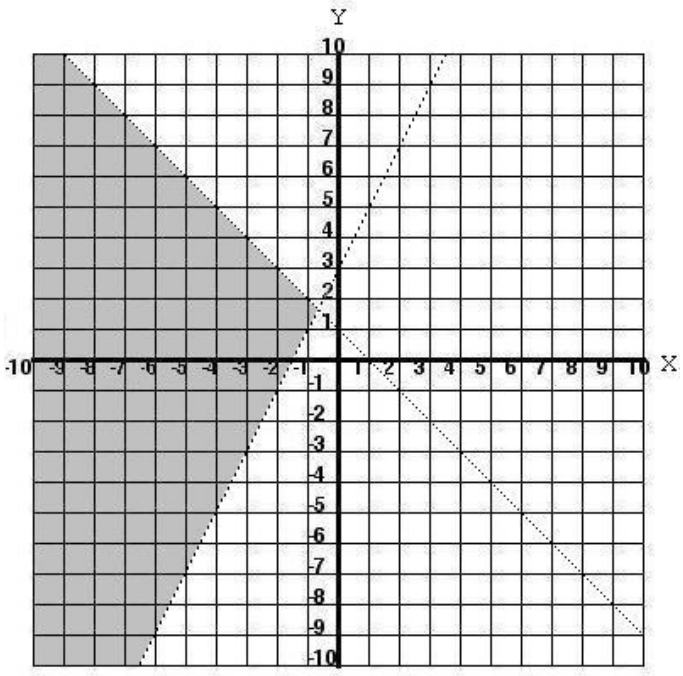
_____ 60. The graph shown below represents the solution to which system of inequalities?

C $\begin{cases} -2x + y \geq 3 \\ x + y \leq 1 \end{cases}$

D $\begin{cases} -2x + y > 3 \\ x + y < 1 \end{cases}$

E $\begin{cases} -2x + y \leq 3 \\ x + y \geq 1 \end{cases}$

F $\begin{cases} -2x + y < 3 \\ x + y > 1 \end{cases}$



_____ 61. What value of y is the solution to the equation

$$\frac{4y-10}{3}+\frac{6y+8}{2}=9\ ?$$

A) $y=\frac{28}{5}$

B) $y=\frac{25}{13}$

C) $y=\frac{8}{5}$

D) $y=\frac{23}{24}$

IV. Free Response

_____ 62. Solve the system using any method:

$$\begin{cases} 2x+5y=11 \\ 4x-3y=-17 \end{cases}$$

_____ 63. Determine the equation of a circle with center (-1, 3) and radius 7.

_____ 64. Expand the following: $(x+y)^4$

_____ 65. The center of a circle is (5, -3), and one endpoint of a diameter is (9, 6). Determine the other endpoint.

_____ 66. Write out all the ***possible*** rational solutions for $2x^3 - 8x^2 + 4x + 3 = 0$

_____ 67. Solve the following equation over the set of complex numbers:
Solve for x: $x^3 + 3x^2 - 4 = 0$

_____ 68. Solve the exponential equation $3^x = 272$

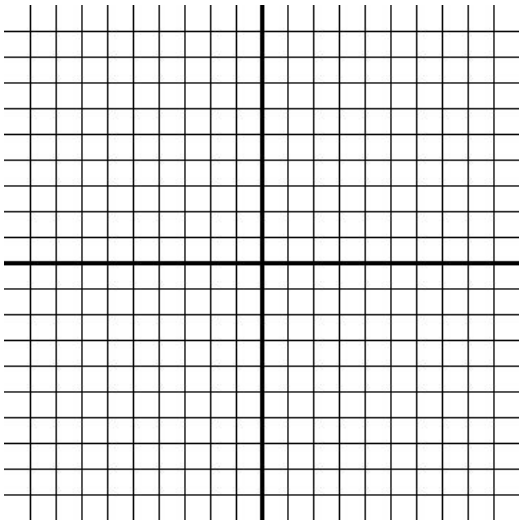
_____ 69. Solve the equation $49^{x-2} = 7^{x+5}$

_____ 70. If you invest $6,500 for 4 years at 3.2% annual interest rate, how much will your investment amount to if the interest is compounded quarterly?

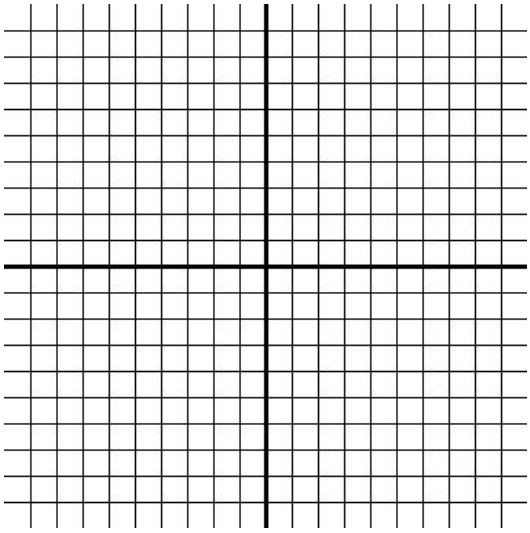
71. Complete the missing elements of Pascal's Triangle:

1
1 1
1 __ 1
1 __ __ 1

72. Graph $3x^2 - 12x - 2y^2 - 8y = 8$



73. Graph $9x^2 + 16y^2 = 144$



74. Perform the following long division problem using ANY method:
SHOW ALL WORK.

$$\left(8v^4 - 2v^2 + v + 4\right) \div \left(v - 1\right)$$

75. Simplify completely: $\dfrac{x!}{(x-2)!}$

(Hint: There should be no factorial symbols in your answer)