Math 1314 Final Review

1. (1.1) Determine which point does **not** lie on the graph of the equation $y = 7x^2 - 3x + 2$.
   a. $(1,6)$
   b. $(0,2)$
   c. $(-2,36)$
   d. $(-1,-8)$
   e. $(2,24)$

2. (1.1) Determine the symmetry with respect to the axes and the origin.

   $y = 6x^5 - x^3$

3. (1.1) Write the standard form of the equation of the circle with the given characteristics.
   center: $(-6,\ 4)$; solution point: $(-7,\ 8)$

4. (1.1) Write the standard form of the equation of the circle with the given characteristics.
   endpoints of a diameter: $(5,\ -6)$, $(9,\ -4)$

5. (1.1) Find the center and radius of the circle $(x-9)^2 + (y+3)^2 = 36$.

6. (1.4) Solve the equation $4x^2 = 25$.

7. (1.4) Solve the equation $(6x+8)^2 = 19$.

8. (1.4) Use the Quadratic Formula to solve $x^2 + 20x + 98 = 0$.

9. (1.4) Solve the following quadratic equation.

   $15x^2 = 10x$

10. (1.5) Solve the equation and write complex solutions in standard form.

    $x^2 + 8x + 25 = 0$

11. (1.6) Find all solutions to the equation $16x^4 - 65x^2 + 4 = 0$.

12. (1.6) Find all solutions to the following equation.

    $\sqrt{17 - x} - 14 = 0$

13. (1.6) Find all solutions to the following equation.

$x - \sqrt{x+3} = 3$

14. (1.6) Find all solutions to the following equation.

$\sqrt{2x-1} = \sqrt{2x+10}$

15. (1.7) Solve the inequality :

$|13x + 1| < 7$

16. (1.7) Solve the inequality :

$|2x + 7| \leq -10$

17. (1.8) Solve the inequality.

$4x^2 + 12x \leq -8$

18. (1.8) Solve the inequality.

$\frac{x-7}{x+1} \geq 0$

19. (2.1) Write the slope-intercept form of the equation of the line through the given point parallel to the given line.

point: (-4, 5) line: $y = \frac{7}{4}x - 5$

20. (2.1) Write the slope-intercept form of the equation of the line through the given point perpendicular to the given line.

point: (–8, 6) line: $9x - 45y = 6$

21. (2.2) Evaluate the function at the specified value of the independent variable and simplify.

$$g(w) = \begin{cases} -w, & w \leq -1 \\ -w^2 - 2w, & -1 \leq w \leq 1 \\ -w^3 - 2w^2, & w > 1 \end{cases}$$

$g\left(-\frac{1}{3}\right)$

22. (2.2) Evaluate the function at the specified value of the independent variable and simplify.

$$f(x) = \begin{cases} (x+1)^2, & x \le -1 \\ 3, & -1 < x \le 2 \\ 3x^2, & x > 2 \end{cases}$$

$f(1)$

23. (2.2) Find the domain of the function.

$$f(x) = \frac{x-8}{x+3}$$

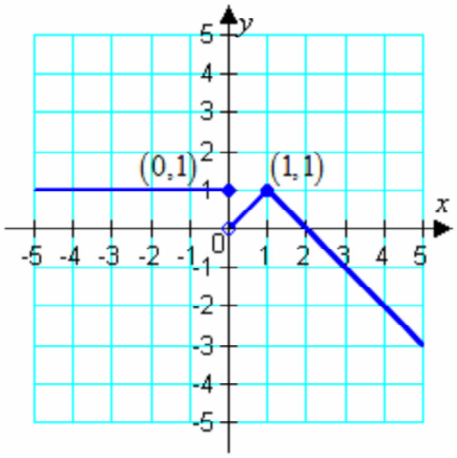
24. (2.2) Find the domain of the function.

$f(x) = \sqrt{18-3x}$

25. (2.2) Find the difference quotient and simplify your answer.

$f(w) = 7w^2 - w, \dfrac{f(3+h) - f(3)}{h}, h \neq 0$

26. (2.3) Determine the interval on which the function in the graph below is increasing.



27. (2.5) Describe the sequence of transformations from the parent function $f(x) = x^3$ to g.

$g(x) = 4(x-4)^3$

28. (2.5) Write the function that is described by the following characteristics:

the shape of $f(x) = x^3$, but moved two units up, eight units to the right.

29. (2.6) Find $(f+g)(x)$.

$f(x) = 2x^2 - 2x + 7$
$g(x) = 4x^2 - 2x + 9$

30. (2.6) Evaluate the indicated function for $f(x) = x - 2$ and $g(x) = x^2 - 2$.

$(fg)(-2)$

31. (2.6) Find $g \circ f$.

$f(x) = x - 3 \qquad g(x) = x^2$

32. (2.6) Find $f \circ g$.

$f(x) = 3x + 3 \qquad g(x) = x - 8$

33. (2.7) Find the inverse function of f.

$f(x) = x^7 - 1$

34. (3.1) From the graph of the quadratic function $f(x) = 4(x-3)^2 + 8$, determine the equation of the axis of symmetry.

35. (3.1) Find the vertex of the parabola
$y = x^2 + x + \frac{5}{4}$.

36. (3.1) Write the standard form of the function of the parabola $f(x) = -x^2 + 2x + 2$.

37. (3.1) Write the standard form of the function of the parabola that has a vertex at $(-8, -3)$ and passes through the point $(-6, 2)$.

38. (3.2) Describe the right-hand and the left-hand behavior of the graph of $n(x) = -5x^4 + 10x^3 - 7$.

39. (3.3) Use synthetic division to find the remainder when $f(x) = x^3 - 3x^2 - 3x - 32$ is divided by $x - 5$.

40. (3.4) List all possible rational zeros given by the Rational Zeros Theorem. Do not check to see which actually are zeros.
$P(x) = 3x^4 + 12x^3 - 11x^2 + 7x + 10$

41. (3.4) Find all real zeros of the polynomial $f(x) = x^3 + 7x^2 - 4x - 28$.

42. (4.1) Determine the zeros (if any) of the rational function $f(x)=\dfrac{x^2-49}{x-4}$.

43. (4.2) Determine the equations of any horizontal and vertical asymptotes of $f(x) = \dfrac{x^2-9}{x^2+2x-15}$.

44. (4.2) Determine the equations of any horizontal and vertical asymptotes of $f(x) = \dfrac{6x+6}{x^2-6x}$.

45. (5.2) Rewrite the logarithmic equation $\log_4 \dfrac{1}{16} = -2$ in exponential form.

46. (5.2) Rewrite the exponential equation $4^{-2} = \dfrac{1}{16}$ in logarithmic form.

47. (5.2) Simplify the expression $\log_3 \left(\dfrac{1}{27} \right)^4$.

48. (5.3) Condense the expression $7\left(\log x - \log y \right)$ to the logarithm of a single term.

49. (5.3) Condense the expression $\log_3 x + \log_3 4$ to the logarithm of a single term.

50. (5.3) Condense the expression $\dfrac{1}{3}\left[\log_4 x + \log_4 5 \right] - \left[\log_4 y \right]$ to the logarithm of a single term.

51. (5.4) Solve the equation.
$\log_3 (x-6) + \log_3 x = 3$

52. (5.4) Solve $3^{x-1} = 81$

53. (5.4) Solve: $2e^x = 10$

54. (6.1) Solve the system.

$$\begin{cases} x - y = -19 \\ x^2 - y = 1 \end{cases}$$

55. (6.1) Solve the system of equations for real values of 'x' only.

$$\begin{cases} 2x + y = 5 \\ x^2 + y^2 = 10 \end{cases}$$

56. (6.2) Solve the system.

$$\begin{cases} -7x - 9y = -33 \\ 9x - y = 55 \end{cases}$$

57. (6.2) Solve the system.

$$\begin{cases} \frac{8}{5}x + \frac{1}{5}y = -\frac{9}{5} \\ 8x + y = -9 \end{cases}$$

58. (7.2) If possible, find $A + B$.

$$A = \begin{bmatrix} 9 & 0 \\ -3 & 4 \end{bmatrix}, B = \begin{bmatrix} -2 & -1 \\ 7 & -7 \end{bmatrix}$$

59. (7.2) If possible, find $3A - 2B$.

$$A = \begin{bmatrix} 2 & 6 & -1 \\ 6 & 7 & 8 \end{bmatrix}, B = \begin{bmatrix} 2 & -1 & 4 \\ -5 & 0 & 5 \end{bmatrix}$$

60. (7.4) Find the determinant of the matrix $\begin{bmatrix} -3 & -2 \\ -8 & 7 \end{bmatrix}$.

Math 1314 Final Review
Answer Section

1. ANS: D
2. ANS:
   Symmetric with respect to the origin.
3. ANS:
   $(x+6)^2+\left(y-4\right)^2=17$
4. ANS:
   $(x-7)^2+\left(y+5\right)^2=5$
5. ANS:
   center: $(9,\ -3)$, radius 6
6. ANS:
   $x=\frac{5}{2},\quad -\frac{5}{2}$
7. ANS:
   $x=\frac{-8+\sqrt{19}}{6},\quad \frac{-8-\sqrt{19}}{6}$
8. ANS:
   $x=-\sqrt{2}-10,\quad x=\sqrt{2}-10$
9. ANS:
   $x=\frac{2}{3},\quad x=0$
10. ANS:
    $x=-4-3i,-4+3i$
11. ANS:
    $x=-\frac{1}{4},\quad x=\frac{1}{4},\quad x=-2,\quad x=2$
12. ANS:
    $x=-179$
13. ANS:
    $x=6$
14. ANS:
    no solution
15. ANS:
    $\left(-\frac{8}{13},\frac{6}{13}\right)$
16. ANS:
    No solution
17. ANS:
    $[-2,-1]$
18. ANS:
    $(-\infty,-1)\cup[7,\infty)$

19. ANS:
$y = \frac{7}{4}x + 12$
20. ANS:
$y = -5x - 34$

OBJ: Find equation of line perpendicular to another line through given point
21. ANS:
$\frac{5}{9}$

OBJ: Evaluate functions
22. ANS:
3
23. ANS:
$(-\infty, -3) \cup (-3, \infty)$
24. ANS:
$(-\infty, 6]$
25. ANS:
$41 + 7h$

OBJ: Find difference quotients
26. ANS:
increasing on $(0,\ 1)$

OBJ: Determine intervals on which functions are increasing or decreasing
27. ANS:
horizontal shift 4 units right; then vertical stretch by a factor of 4

OBJ: Recognize transformed graphs of common functions
28. ANS:
$g(x) = 2 + (x + 8)^3$

OBJ: Write equations for transformations of common functions
29. ANS:
$(f + g)(x) = 6x^2 - 4x + 16$

OBJ: Find combinations of functions
30. ANS:
-8

OBJ: Evaluate combinations of functions

31. ANS:
$\left(g \circ f\right)(x) = x^2 - 6x + 9$

OBJ: Find compositions of functions

32. ANS:
$\left(f \circ g\right)(x) = 3x - 21$

OBJ: Find compositions of functions

33. ANS:
$f^{-1}(x) = \sqrt[7]{x+1}$

OBJ: Find inverse of functions

34. ANS:
$x = 3$

OBJ: Determine axis of symmetry

35. ANS:
$\left(\frac{-1}{2}, 1\right)$

OBJ: Determine vertex of quadratic function

36. ANS:
$f(x) = -(x-1)^2 + 3$

OBJ: Write quadratic function in standard form

37. ANS:
$f(x) = \frac{5}{4}(x+8)^2 - 3$

OBJ: Write standard form of a parabola

38. ANS:
Because the degree is even and the leading coefficient is negative, the graph falls to the left and falls to the right.

OBJ: Determine right/left-hand behavior of polynomial

39. ANS:
$+3$

OBJ: Rewrite polynomial: quotient and remainder

40. ANS:
$\pm 1, \pm 2, \pm 5, \pm 10, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{5}{3}, \pm \frac{10}{3}$

41. ANS:
$x = 2; x = -2; x = -7$

OBJ: Determine zeros and multiplicity

42. ANS:
$x = -7, x = 7$

OBJ: Determine zeros of a rational function

43. ANS:
horizontal: $y = 1$; vertical: $x = -5$

OBJ: Determine vertical and horizontal asymptotes

44. ANS:
horizontal: $y = 0$; vertical: $x = 6$ and $x = 0$

OBJ: Determine intercepts of rational function

45. ANS:
$4^{-2} = \frac{1}{16}$

OBJ: Express logarithmic equation in exponential form

46. ANS:
$\log_4 \frac{1}{16} = -2$

OBJ: Express exponential equation in logarithmic form

47. ANS:
-12

OBJ: Simplify logarithmic functions

48. ANS:
$\log\left(\frac{x}{y}\right)^7$

OBJ: Condense logarithmic function using the properties of logs

49. ANS:
$\log_3 4x$

OBJ: Condense logarithmic function using the properties of logs

50. ANS:
$\log_4 \frac{\sqrt[3]{5x}}{y}$

OBJ: Condense logarithmic function using the properties of logs

51. ANS:
$x = 9$

52. ANS:
5

OBJ: Solve exponential equations
53. ANS:
$\ln 5$

OBJ: Solve exponential equations
54. ANS:
(–4, 15), (5, 24)

OBJ: Solve systems of equations in two variables by substitution
55. ANS:
$x = 1, x = 3$
56. ANS:
$(6, -1)$

OBJ: Solve systems of equations in two variables by elimination
57. ANS:
$(a, -9 - 8a)$ (dependent)

OBJ: Solve systems of equations in two variables by elimination
58. ANS:
$\begin{bmatrix} 7 & -1 \\ 4 & -3 \end{bmatrix}$

OBJ: Add and subtract matrices
59. ANS:
$\begin{bmatrix} 2 & 20 & -11 \\ 28 & 21 & 14 \end{bmatrix}$

OBJ: Add and subtract matrices
60. ANS:
–37

OBJ: Find the determinant of a matrix