PreCalculus Honors Summer Review Packet

The problems included in this packet are intended to be a review of some of the skills and concepts that you learned in Algebra I, Geometry, and Algebra II and will need to know to be successful in PreCalculus Honors. **This assignment should not be a group effort, as students are expected to complete this assignment independently.**

Please do not wait until a day or two before school begins to begin working on this packet. If you plan ahead and work a few pages at a time throughout the summer, this packet should act as a gentle reminder of previously learned material.

There is not enough room to complete problems on the pages of the packet itself. **Please rewrite each problem and do your work on separate sheets of paper.** You can write on the backs of pages, but please write neatly and clearly. **You must show all of your work.**

This packet must be completed and ready to turn in on the FIRST day of your PreCalculus Honors class. The work will be counted as three homework grades.

Pre-Calculus Honors Summer Packet

1. Find the vertex of the parabola f(x). Graph f(x) on the attached graph paper. Include the axis of symmetry, the equation of the axis of symmetry and two points on f(x).

$$f(x) = x^2 + 15x + 56$$

2. Find the zeros of h(x) by factoring.

$$h(x) = x^2 - 4x - 12$$

3. Solve for x.

$$x^2 - 12x + 36 = 32$$

4. Simplify.

$$6\sqrt{-675}$$

5. Find the zeros of f(x).

$$f(x) = x^2 - 6x + 11$$

6. Find the zeros of g(x) by using the Quadratic formula.

$$g(x) = x^2 + 2x + 24$$

7. Find the number and type of solutions for f(x). One real solution? 2 imaginary solutions? 2 real solutions? Justify your answer.

$$f(x) = x^2 - 4x + 5$$

8. Simplify.

$$(8 - 3i) - (5 - 4i)$$

9. Simplify.

*Rationalize the denominator.

$$\frac{-3 + 2i}{6 + 3i}$$

10. Simplify.

$$(6 - 3i)^2$$

11. Simplify.

$$(4x^4 - 2x^3) + (x^4 + 11x^3 - 8)$$

12. Simplify.

$$7xy^5\,(-2x^5y^4 - x^2y)$$

13. Use long division to divide

$$f(x) = x^3 + 5x^2 - 7x + 2 \qquad by \qquad x - 2$$

14. Use synthetic substitution to evaluate the polynomial

$$P(x) = 2x^3 + x^2 - 8x + 5 \qquad for \qquad x = -3$$

15. Use synthetic division to determine if (x-2) is a factor of the polynomial

$$P(x) = x^3 + 4x^2 - 3x - 18$$

16. Factor.

$$54x^8 + 16x^5y^3$$

*Remember: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

17. Solve the polynomial equation by factoring.

$$2x^5 + 8x^4 - 10x^3 = 0$$

18. Using your TI-84, graph g(x) on the attached graph paper. Over what interval is g(x) increasing?

$$g(x) = -2 + |x + 3|$$

19. On the attached piece of graph paper, graph f(x). Find the domain and range on f(x). How is f(x) increasing and decreasing? Find the rate of change over the interval (-1,3).

$$f(x) = \begin{cases} 2x + 1 & -5 < x \leq -1 \\ -1x - 2 & -1 < x \leq 3 \\ -5 & 3 < x < 5 \end{cases}$$

20. Identify the leading coefficient, degree, and end behavior or P(x). Graph P(x).

$$P(x) = -6x^4 - 2x^2 + 1$$

21. Find the vertex of the parabola f(x). Graph f(x) on the attached graph paper. Include the axis of symmetry, the equation of the axis of symmetry and two points on f(x).

$$f(x) = -2\,(x-4)^2 + 4$$

22. Create Pascal's Triangle. Expand the binomial using Pascal's Triangle.

$$(3x - y)^4$$

23. Complete the square and rewrite f(x) in vertex form. Find the vertex of f(x), and graph the parabola on the attached graph paper. Include the axis of symmetry, the equation of the axis of symmetry, and two points on f(x).

$$f(x) = 4x^2 - 8x + 13$$

24. Find the sum of the first 45 terms of the following sequence:

$$-2\,,2\,,6\,,10\,\ldots$$

25. What is the 50^{th} term in the sequence?

$$4\,,14\,,24\,,34\,\ldots$$

26. Solve the system of equations.

$$10x - 12y - 8z = 16$$
$$10x + 6y - z = -63$$
$$-10x + 3y + z = 27$$

27. P varies inversely with x. If P = -4 when x = 12, find the value of P when x = 4.

28. Graph the function g(x). Include vertical and horizontal asymptotes on your graph.

$$g(x) = \frac{1}{x - 3}$$

29. Solve for x.

$$\frac{x + 1}{x^2 + x - 2} = \frac{1}{x - 1} + \frac{1}{x + 2}$$

30. Elizabeth can paint a fence in 4 hours. Working at a constant rate, Maggie can paint the same fence in 2 hours. How long will it take them to paint the fence if they both work together?

31. Without graphing f(x), determine the vertical and horizontal asymptotes of the function.

$$f(x) = \frac{x^2 - 1}{x^2 + x - 2}$$

32. Solve for x.

$$\frac{5}{x^2 + x - 6} = 2 + \frac{x - 3}{x - 2}$$

33. Multiply and simplify.

$$(3\sqrt{18} - \sqrt{75})(\sqrt{2})$$

34. Simplify by rationalizing the denominator.

$$\frac{\sqrt{x} + 1}{\sqrt{x} - 1}$$

35. Evaluate the expression.

$$x^2 + 3x - 1 \qquad when \qquad x = 1 + \sqrt{2}$$

36. The graph of f(x) is translated to the right 4 units and up 3 units. What is the equation of the translated graph?

$$f(x) = \sqrt{x} - 4$$

37. Solve for x. Check your solution.

$$\sqrt{x + 2} + \sqrt{x - 2} = 4$$

38. Find the inverse function of g(x).

$$g(x) = \left(\frac{1}{2}\right)^x$$

39. Solve for x. Express your final solution in log base form.

$$3^x = 10$$

40. Expand the equation.

$$log\left(\frac{a^4\, b^3}{c^5}\right)$$

41. Condense the expression.

$$6\log x - (\log y + \log z)$$

42. Describe how the function g(x) = log (x-5) +2 is transformed from the parent function f(x) = log x.

43. Using what you know about cofunctions, find x, y, and z.

$$\cot x = \tan 20°$$

$$\sin 25° = \cos y$$

$$\sec z = \csc 10°$$

44. Using a unit circle, determine what negative angle in the interval [0 , 360°) has the same terminal side as 45°.

45. An angle has a reference angle of $20°$ and its terminal side lies in Quadrant II. Find a possible positive and negative measure for the angle. Include a sketch of the angle in your solution.

46. Θ is in Quadrant III and $\sin \Theta = -1/5$. Create a triangle in the appropriate quadrant and find missing sides. Find $\cos \Theta$.

47. Escape velocity $v = \frac{(2gm)^{\frac{1}{2}}}{r^{\frac{1}{2}}}$ where g is the gravitational constant, m is mass, and r is the radius of a star or planet. Rewrite the equation to solve g.

48. Using your TI-84 calculator, do a linear regression to find the "best fit" model for the following data set. Explain how you found your equation.

X	-13	2	14	20	29
Y	-4	1	5	7	10

49. Rewrite the logarithmic equation in exponential form.

$$\log_2 x = 5$$

50. Rewrite the exponential equation in logarithmic form.

$$3^y = x$$

51. Solve for x algebraically.

*This is not a calculator-based problem.

$$2^x = 8$$

52. Solve for x algebraically.

*This is not a calculator-based problem.

$$3^x = 8$$

53. Find the slope of the line through points (-1, -2) and (-4, -5).

54. Find the x and y intercepts of -4x – 3y = 16. Graph the line on the attached graph paper.

55. Rewrite the equation in slope intercept form. Graph the line on the attached graph paper.

$$-4x - 3y = 1$$

m = ?

y-int = ?

56. Find the equation of the line containing points (1,1) and (2, -2).

57. Find the equation of the line that passes through (7, 2) and has a slope of 0.

58. Find the equation of the vertical line that passes through point (-2, 5).

59. Simplify.

$$\sqrt{18} + \sqrt{8} - 4\sqrt{2}$$

60. Simplify.

$$4x\ \sqrt[3]{27x^3y^7}$$

61. Solve. Check for extraneous solutions.

$$\sqrt[3]{3x} = \sqrt[3]{x-4}$$

62. Solve. Check for extraneous solutions.

$$2\sqrt{x} - 3 = -7$$

63. Solve. Check for extraneous solutions.

$$\sqrt{2x-3} = \sqrt{4x-7}$$

64. Find the equation of the line that is parallel to $3x - 2y = 12$ and passes through point $(0, 0)$.

65. Find the equation of the line that is perpendicular to $-2x + 3y = 6$ and passes through point $(1, 1)$.

66. Graph $f(x)$ on the attached graph paper. Find the domain and range of $f(x)$.

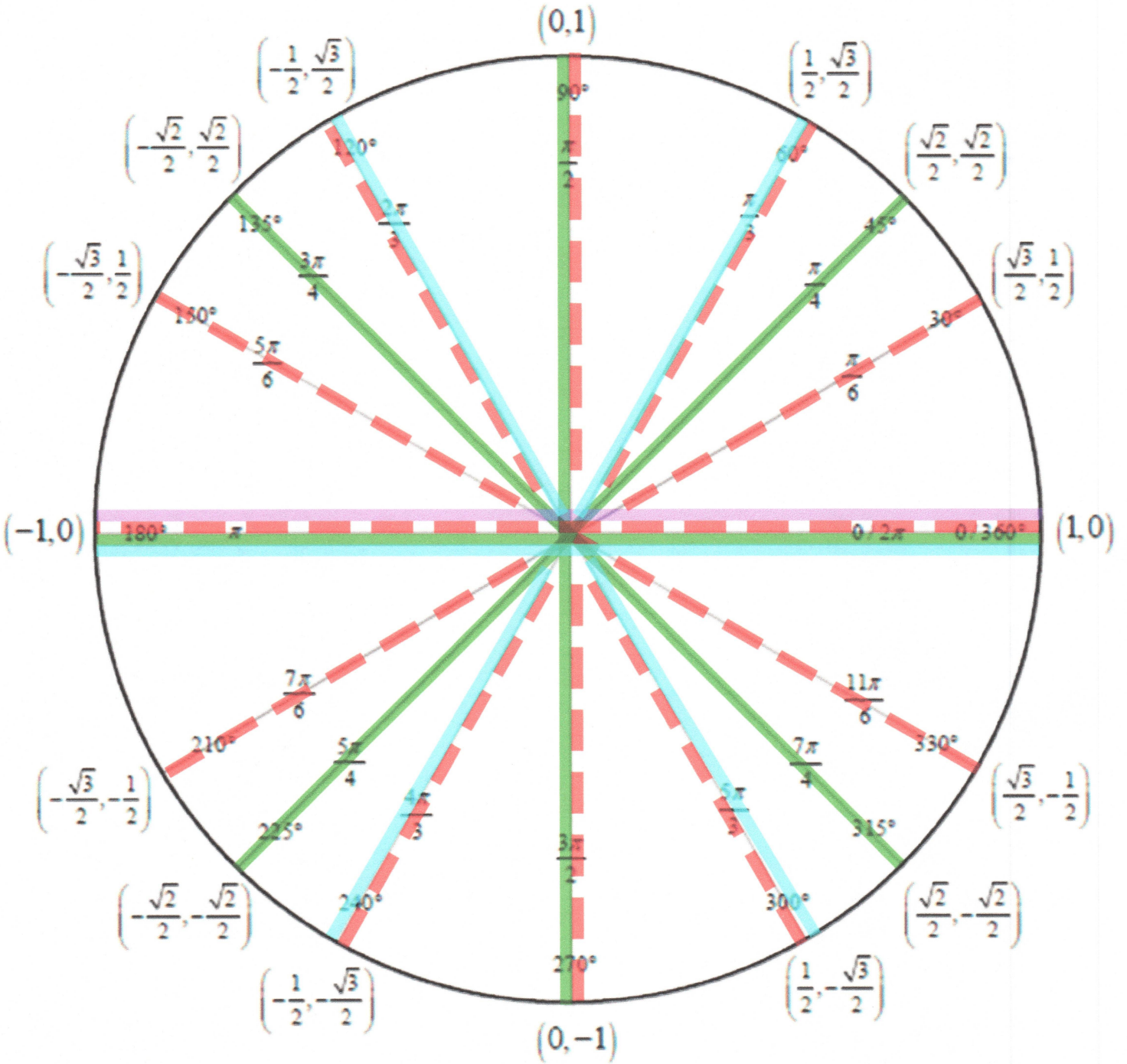
$$f(x) = |x + 4|$$

67. Graph $g(x)$ on the attached graph paper. Find the domain and range of $g(x)$.

$$g(x) = (2x - 3)^{1/2}$$

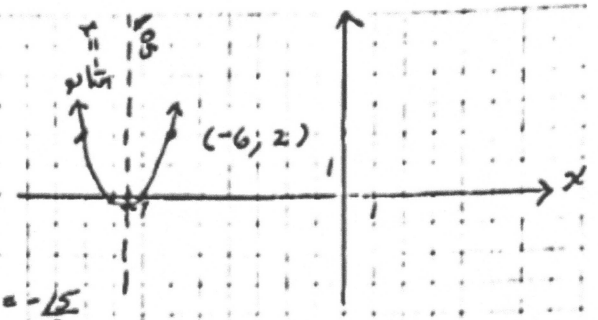
68. Graph h(x) on the attached graph paper. Find the domain and range of h(x).

$$h(x) = \frac{x}{x-2}$$


(0,1)
$\left(-\frac{1}{2},\frac{\sqrt{3}}{2}\right)$
$\left(\frac{1}{2},\frac{\sqrt{3}}{2}\right)$
$\left(-\frac{\sqrt{2}}{2},\frac{\sqrt{2}}{2}\right)$
$\left(\frac{\sqrt{2}}{2},\frac{\sqrt{2}}{2}\right)$
$\left(-\frac{\sqrt{3}}{2},\frac{1}{2}\right)$
$\left(\frac{\sqrt{3}}{2},\frac{1}{2}\right)$
(−1,0)
(1,0)
$\left(-\frac{\sqrt{3}}{2},-\frac{1}{2}\right)$
$\left(\frac{\sqrt{3}}{2},-\frac{1}{2}\right)$
$\left(-\frac{\sqrt{2}}{2},-\frac{\sqrt{2}}{2}\right)$
$\left(\frac{\sqrt{2}}{2},-\frac{\sqrt{2}}{2}\right)$
$\left(-\frac{1}{2},-\frac{\sqrt{3}}{2}\right)$
$\left(\frac{1}{2},-\frac{\sqrt{3}}{2}\right)$
(0,−1)
90°
$\frac{\pi}{2}$
120°
$\frac{2\pi}{3}$
60°
$\frac{\pi}{3}$
135°
$\frac{3\pi}{4}$
45°
$\frac{\pi}{4}$
150°
$\frac{5\pi}{6}$
30°
$\frac{\pi}{6}$
180°
π
0, 2π
0, 360°
$\frac{7\pi}{6}$
210°
$\frac{11\pi}{6}$
330°
$\frac{5\pi}{4}$
225°
$\frac{7\pi}{4}$
315°
$\frac{4\pi}{3}$
240°
$\frac{5\pi}{3}$
300°
$\frac{3\pi}{2}$
270°

PreCalculus Honors.
Key

1. Vertex $(-\frac{5}{2}, -\frac{1}{4})$



pts $(-6,2)$ $(-9,2)$

Axis of symmetry $x = -\frac{5}{2}$

2. $x = -2$, $x = 6$

3. $x = 6 + 4\sqrt{2}$, $x = 6 - 4\sqrt{2}$

4. $9 \pm i\sqrt{3}$

5. $x = 3 + i\sqrt{2}$, $x = 3 - i\sqrt{2}$

6. $x = -1 \pm i\sqrt{23}$

7. 2 imaginary solutions

8. $3 + 1i$

9. $-\frac{4}{15} + \frac{7}{15}i$

10. $27 - 36i$

11. $5x^4 + 9x^3 - 8$

12. $-14x^6y^9 - 7x^3y^6$

13. $x^2 + 7x + 7 + \frac{16}{x-2}$

14. $P(-3) = -16$

15. $(x-2)$ is a factor of $P(x)$.

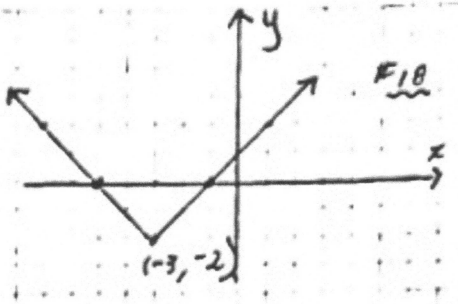
16. $2x^5(3x + 2y)(9x^2 - 6xy + 4y^2)$

17. $x = 0$, $x = 1$, $x = -5$

18. $g(x) = -2 + |x+3|$

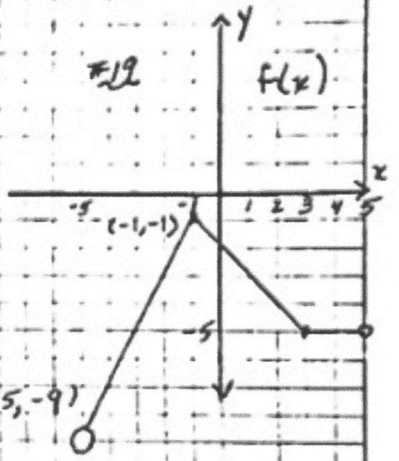
Decreasing from $(-\infty, -3)$

Increasing from $(-3, +\infty)$



#18

19. $f(x) = \begin{cases} 2x+1 & -5 < x \le -1 \\ -1x-2 & -1 < x \le 3 \\ -5 & 3 < x < 5 \end{cases}$



#19

Domain: $(-5, 5)$

Range: $(-9, -1]$

Increasing $(-5, -1)$

Decreasing $(-1, 3)$

Constant $(3, 5)$

Rate of change over $(-1, 3)$: -1

20. Leading coefficient: -6

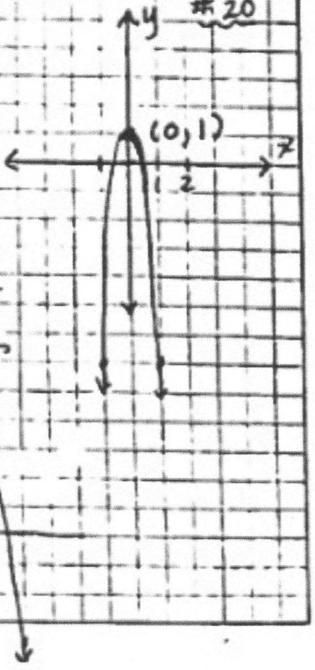
Degree: 4

End behavior: Down, Down

21. Vertex: $(4, 4)$

Axis of symmetry: $x = 4$

Pts $(3, 2)$ $(5, 2)$



#20

12.

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

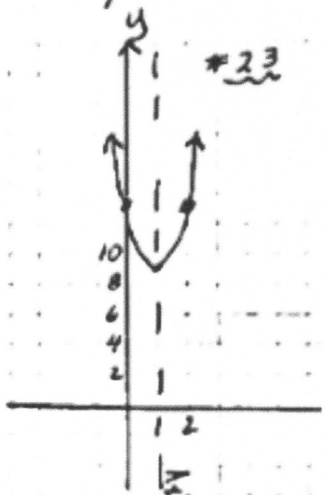
$81x^4 - 108x^3y + 54x^2y^2 - 12xy^3 + y^4$

23. $f(x) = 4(x-1)^2 + 9$

Vertex: $(1, 9)$

Axis of Symmetry: $x = 1$

Pts: $(0, 13)$, $(2, 13)$



#23

24. Arithmetic sequence

$d = 4$

$S_{45} = \frac{n}{2}(a_1 + a_n)$

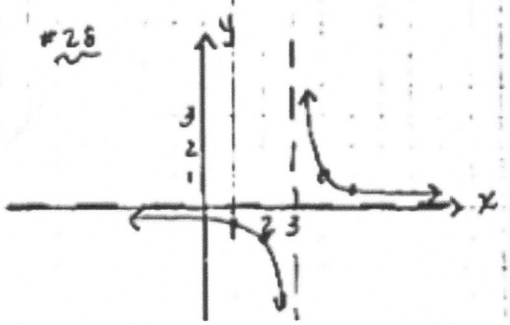
$S_{45} = 3870$

25. $a_{50} = 494$

26. $x = -4$, $y = -4$, $z = 1$

27. $p = -12$

28. $g(x) = \frac{1}{x-3}$



#28

29. $x = 0$

30. $\frac{4}{3}$ hrs if they work together

31. Horizontal asymptote: $y = 1$
Vertical asymptote: $x = -2$
Hole in graph of $f(x)$ at $x = 1$

32. $x = \dfrac{-1 \pm \sqrt{79}}{3}$

33. $18 - 5\sqrt{6}$

34. $\dfrac{x + 2\sqrt{x} + 1}{x - 1}$

35. $5 + 5\sqrt{2}$.

36. Found the translated equation? Check your solution using your TI-84 graphing calculator.

37. $x = \frac{17}{4}$

38. $g^{-1}(x) = -\log_2 x$ or $g^{-1}(x) = \log_{\frac{1}{2}} x$

39. $x = \dfrac{\log 10}{\log 3}$

40. $4 \log a + 3 \log b - 5 \log c$

41. $\log \dfrac{x^6}{yz}$

42. $f(x)$ moves $x = 5$ to the right and up 2 to become $g(x)$.

43. $x = 70°$ $y = 65°$ $z = 80°$

44. $-315°$

45. $160°, -200°$

46. $\cos\theta = \frac{-2\sqrt{6}}{5}$

47. $g = \frac{v^2 r}{2m}$

48. $y = \frac{1}{3}x + \frac{1}{3}$

49. $x = 2^5$

50. $\log_3 x = y$

51. $x = 3$

52. $x = \log_3 8$

53. $m = 1$

54. x int: -4
    y int: $-\frac{16}{3}$

55. $y = -\frac{4}{3}x - \frac{1}{3}$ $m = -\frac{4}{3}$ $b = -\frac{1}{3}$

56. $y = -3x + 4$

57. $y = 2$

58. $x = -2$

59. $\sqrt{2}$

60. $12x^2y^2\sqrt[3]{y}$

61. $x = -2$

62. No Solution

63. $x = 2$

64. $y = \frac{3}{2}x$

65. $y = -\frac{3}{2}x + \frac{5}{2}$

66. $D: (-\infty, -\infty)$
$R: [0, +\infty)$

67. $D: [\frac{3}{2}, +\infty)$

$R: [0, +\infty)$

68. Either $x \neq 2$, $y \neq 1$
or $D: (-\infty, 2) \cup (2, +\infty)$
$R: (-\infty, 1) \cup (1, +\infty)$