ST. BRENDAN HIGH SCHOOL

AP Calculus AB
Summer Math Packet

Course 1362

Congratulations! You made it to Calculus!

This summer math packet is a review of concepts learned in Algebra and Pre-Calculus classes that are needed when you begin your Calculus course in August. Completion of the packet will assure that all students begin the school year on the same page and with equal opportunity to learn and build upon mathematical concepts that should have been learned in previous courses.

Instructions for completing the packet:

- Please print the packet or use loose leaf paper to complete the packet by hand showing all work. Work must be neat and legible.
- Please use your Pre-Calculus notes or the websites provided to help you if you need reminders on how to complete some practice problems.
- Take notes as you complete your work. Knowledge of these concepts will be needed throughout your Calculus course. You will be given a quiz on this material the first week of school.
- Work on the packet with your friends. Help each other. Every student is responsible for knowing the material in this packet when you return in August. We will review as a team and everyone will be expected to participate.
- Bring your packet to our first class together. It will be collected for a grade. Only packets done with paper and pencil will be accepted.

Helpful Websites:

http://www.mathtv.com/
http://www.purplemath.com/modules/index.htm
https://www.khanacademy.org

Helpful for graphing functions:
https://www.education.ti.com/en/resources/family-of-functions

Summer Math Packet Name____________________________________ ID: 1

Part I

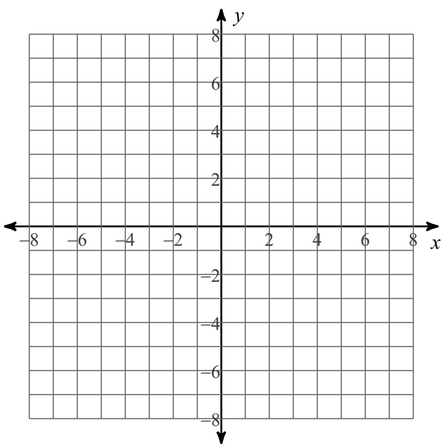
Date________________ Period____

QUADRATIC FUNCTIONS

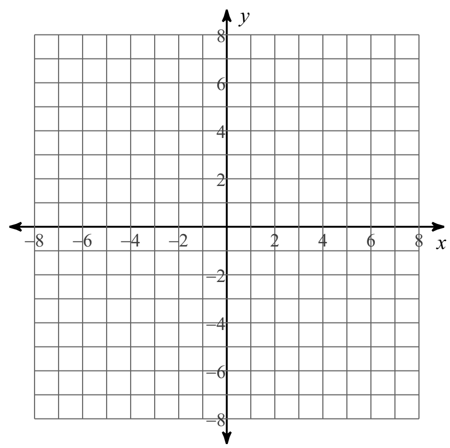
Identify the vertex, axis of symmetry, direction of opening, min/max value, y-intercept, and x-intercepts of each. Then sketch the graph.

Reminder: If the equation is in vertex form the vertex (h,k) is easily identified. If the equation is in standard form, the x-coordinate of the vertex is -b/2a and the y-coordinate is found by evaluating the function using the x-coordinate of the vertex.

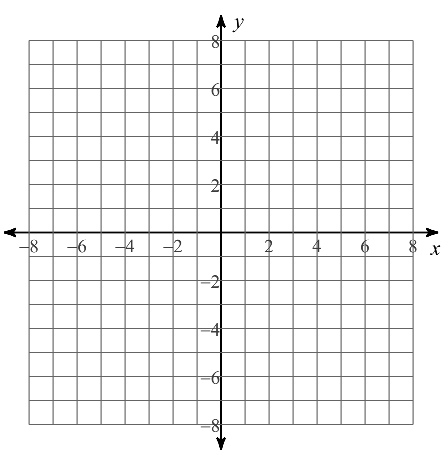
1) $y = x^2$



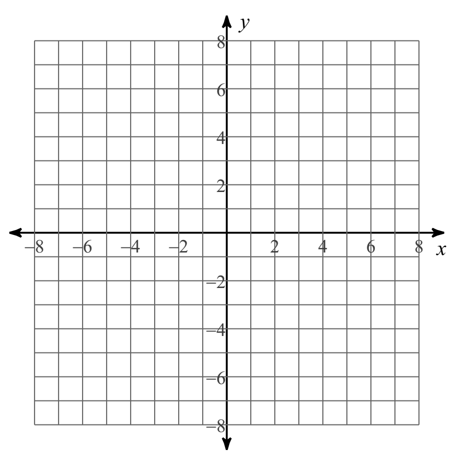
2) $y = -(x - 1)^2 - 1$



3) $y = \frac{1}{2}x^2 + 5x + \frac{27}{2}$



4) $y = -\frac{1}{4}x^2 - \frac{1}{2}x - \frac{5}{4}$



Solve each quadratic equation.

Reminder: Quadratic equations can be solved by factoring, using the square root property, using the quadratic formula, or completing the square. Please show that you know how to use all the methods by following the instructions.

Solve by factoring.

5) $v^2 + 3v = 4$

6) $n^2 - 8 = 2n$

7) $4r^2 + 2r = 0$

8) $2x^2 = -x + 6$

Solve by taking square roots.

9) $6x^2 + 5 = -81$

10) $4x^2 + 10 = 18$

Solve by completing the square.

11) $5x^2 + 20x + 18 = 3$

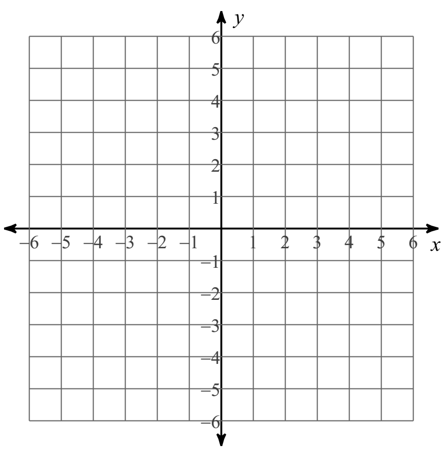
Solve with the quadratic formula.

12) $5n^2 - 124 = 11n$

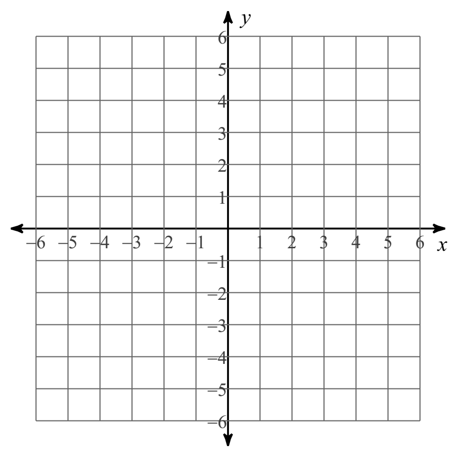
ABSOLUTE VALUE FUNCTIONS

Reminder: To graph an absolute value function you must first identify the vertex and then graph. If the variable inside of the absolute value bars has a coefficient, remember to factor the coefficient outside of the bars before identifying the vertex.

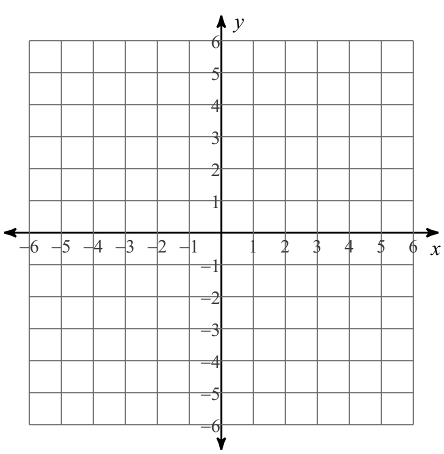
13) $y = \left|x\right| - 2$



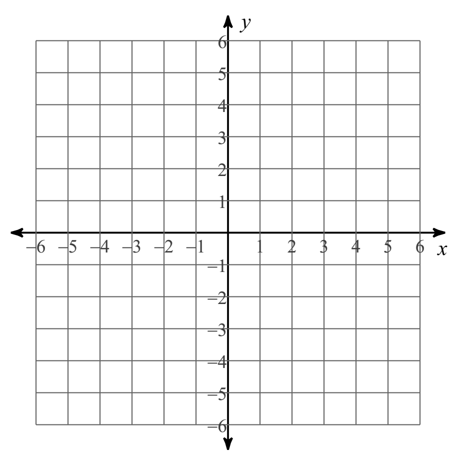
14) $y = -3\left|x - 1\right| - 1$



15) $y = \left|3x + 1\right| - 3$



16) $y = -\left|3x - 3\right|$



Solve each absolute value equation.

Reminder: To solve an absolute value equation you must first isolate the absolute value term on one side of the equation. You may have no solution, one solution, or two solutions. Absolute value equations may contain extraneous solutions, so you must always check your answers.

17) $\left|\frac{x}{10}\right| + 9 = 10$

18) $|a + 4| - 7 = 0$

Solve each absolute value inequality and give the solution using interval notation.

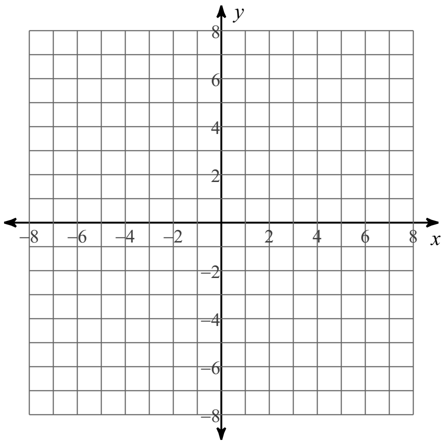
19) $2 - 5|3k| \le -43$

20) $8\left|\frac{r}{2}\right| + 8 \le 36$

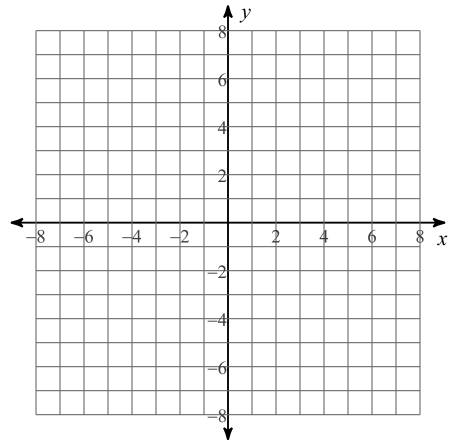
RADICAL FUNCTIONS

Sketch the graph of each function by using transformations. State the domain and range.

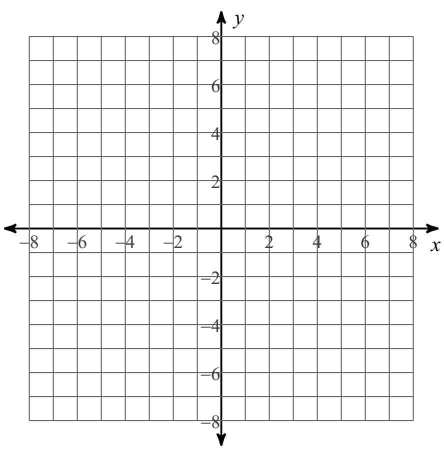
21) $y = \sqrt{x}$



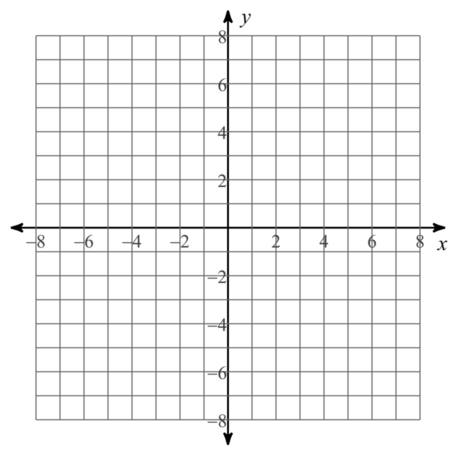
22) $y = \sqrt{x + 3} + 4$



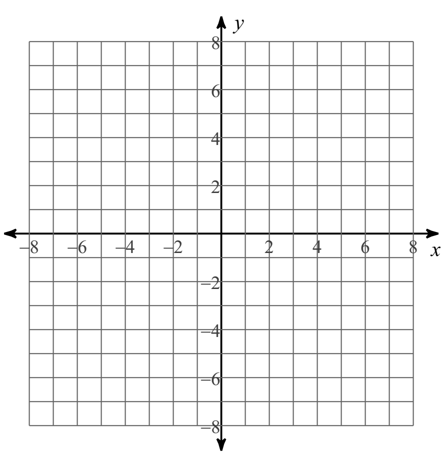
23) $y = -\frac{1}{2}\sqrt{x + 1} + 5$



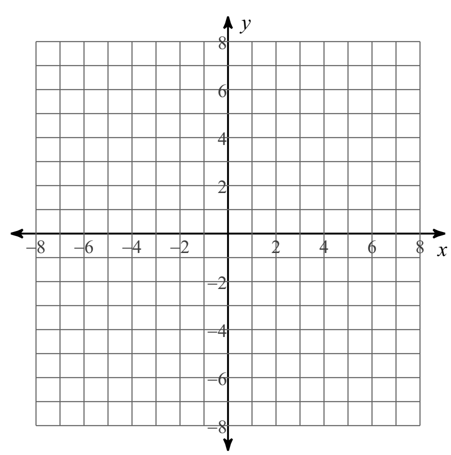
24) $y = 3\sqrt{x - 1} - 5$



25) $y = \sqrt[3]{x}$



26) $y = 3\sqrt[3]{x + 2}$



Solve each radical equation. Remember to check for extraneous solutions.

Reminder: To solve radical equations isolate the radical. If two radicals exist, each radical should be on different sides of the equation and make sure only one side of the equation contains a binomial. Square both sides of the equation. If after squaring both sides, a radical still exists, you must repeat the process.

27) $10\sqrt{\frac{x}{8}} = 100$

28) $p = \sqrt{-18 + 9p}$

29) $\sqrt{4r - 4} = r - 4$

Reminder: To solve equations with a radical greater than two isolate the radical and raise both sides of the equation to the value of the index. To solve equations with a rational exponent, isolate the term with the rational exponent and raise both sides of the equation to the value of the reciprocal of the exponent. If a rational exponent contains a numerator with an even number and a denominator with an odd number, then absolute value must be used to solve the equation.

30) $-11 = -4\sqrt[6]{3x - 17} - 3$

31) $29 = 4 + (2 - 41a)^{\frac{2}{3}}$

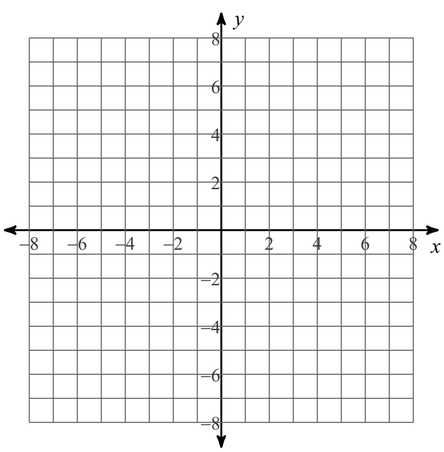
32) $5(13 - 16x)^{\frac{4}{3}} + 7 = 3132$

33) $4(-2 - 3k)^{\frac{3}{2}} - 8 = 248$

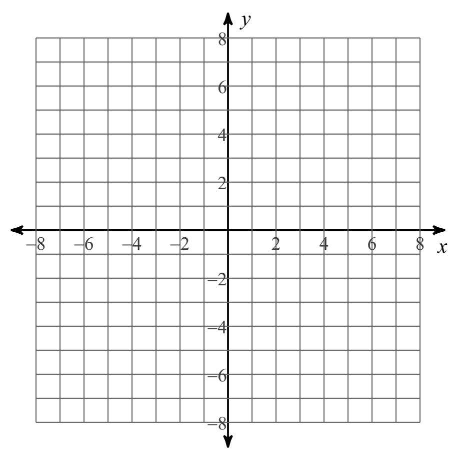
POLYNOMIAL FUNCTIONS

Reminder: To graph a function of degree three or higher you must first find the zeros of the function by factoring or if necessary by using the Rational Root Theorem and synthetic division. Identify the end behavior of the graph, multiplicity of each zero to determine whether the graph touches and turns or crosses the x-axis at the zero , find the y-intercept and then sketch the graph.

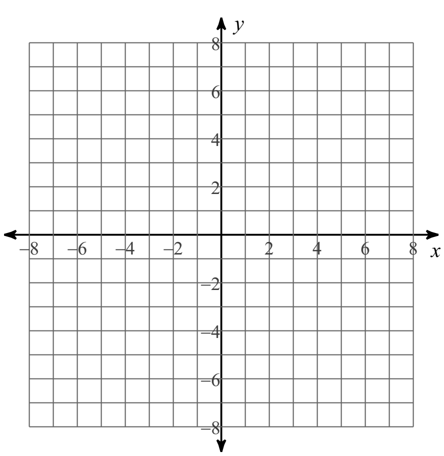
34) $f(x) = x^3 - 3x^2 + 4$



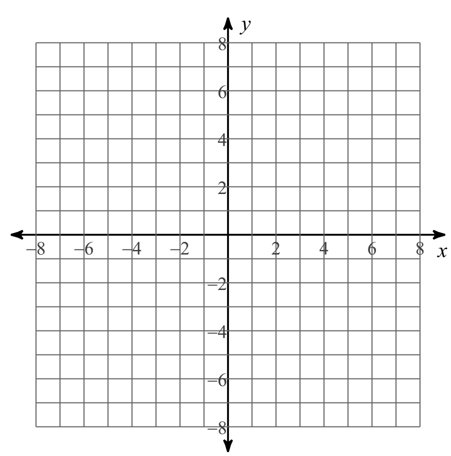
35) $f(x) = x^3 - 3x^2$



36) $f(x) = -x^4 + 4x^2 - 3$



37) $f(x) = x^3 - x^2$



Solve the equations by finding all roots.

Reminder: To solve equations of degree three or higher, start by attempting to factor the equation. If the equation cannot be factored then use the Rational Root Theorem and synthetic division to find your roots. Once you have reduced your polynomial to linear quadratic factors, you may use the quadratic formula to finish solving the equation.

38) $x^3 - 4x^2 - 2x + 8 = 0$

39) $x^4 - x^2 - 20 = 0$

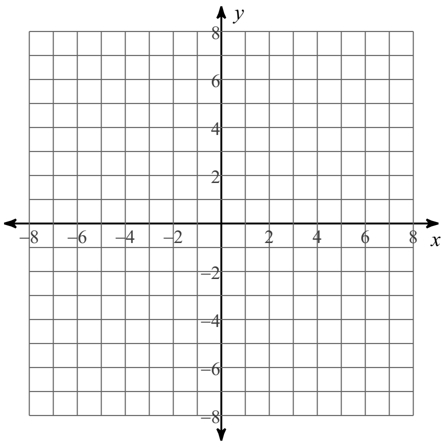
40) $x^3 - 3x - 2 = 0$

41) $x^3 + 5x^2 - 13x + 7 = 0$

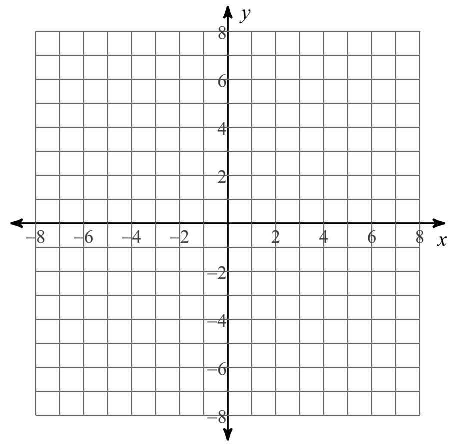
RATIONAL FUNCTIONS

Reminder: To graph rational functions identify the points of discontinuity, holes, vertical asymptotes, x-intercepts, horizontal asymptote, and domain of each. Then sketch the graph.

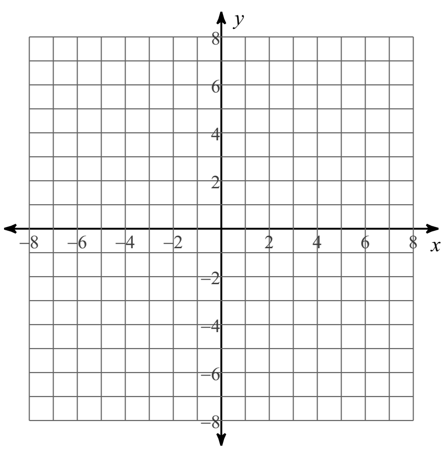
42) $f(x) = \dfrac{1}{x-4} - 1$



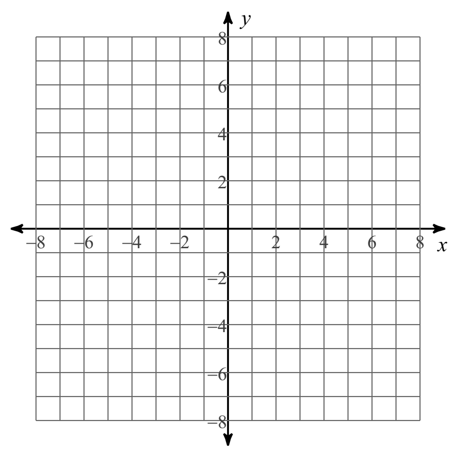
43) $f(x) = \dfrac{2}{x+1}$



44) $f(x) = \dfrac{x^2 - x}{-x^2 - 2x + 3}$



45) $f(x) = \dfrac{-x - 2}{x - 3}$



Solve each rational equation. Remember to check for extraneous solutions.

Reminder: To solve rational equations first multiply both sides of the equation by the least common denominator. This will clear the fractions or rational expressions. To find the LCD factor the denominators.

46) $\frac{1}{x} = \frac{x^2 - 2x - 3}{5x} - 1$

47) $\frac{1}{x^2} = 3 - \frac{2}{x}$

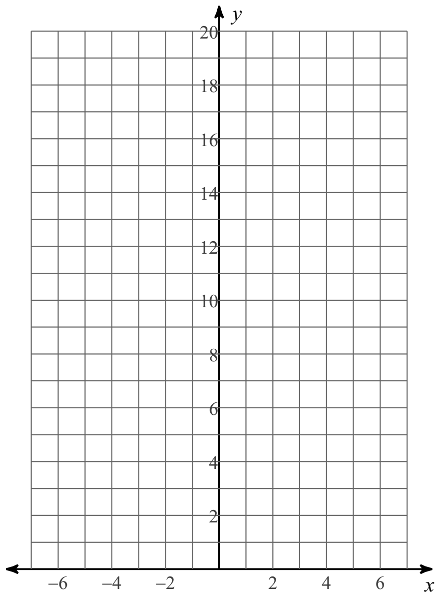
48) $\frac{1}{p^2 + 4p} = \frac{1}{3p + 12} - \frac{1}{3p^2 + 12p}$

49) $1 + \frac{1}{n - 5} = \frac{n^2 - 10n + 24}{n^2 - 3n - 10}$

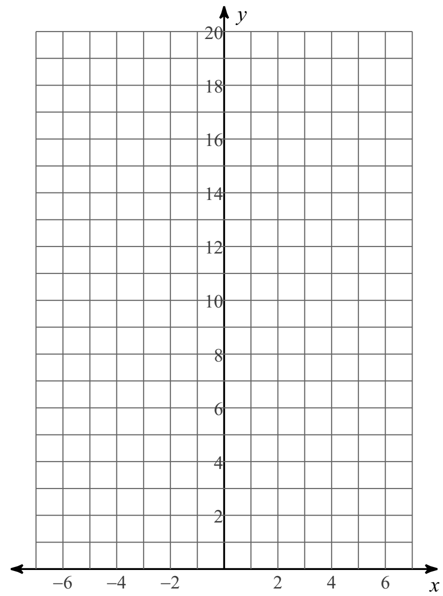
EXPONENTIAL FUNCTIONS

To graph exponential functions,identify transformations, graph the asymptote, and then plot the three basic points (x=-1, x=0, and x=1 at transformation).

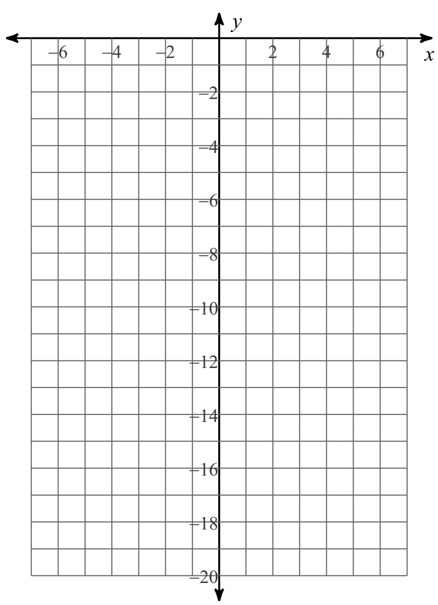
50) $y = \left(\frac{1}{4}\right)^x$



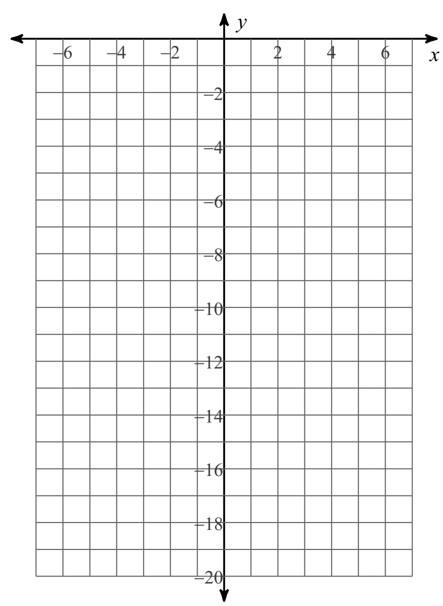
51) $y = 2^x$



52) $y = -4 \cdot 2^x$



53) $y = -2 \cdot \left(\frac{1}{2}\right)^x$



Solve each exponential equation.

Reminder: To solve an exponential equation you must first isolate the exponential term on one side of the equation. If both sides of the equation can be converted to a term with the same base, then the equation can be solved by simply equating the exponents once the terms have the same base. If this is not possible, then you must solve by using logarithms.

54) $3^{3b+3} = \frac{1}{3}$

55) $64^{3n-3} = 16^{-n-2}$

56) $e^{-6v} = 61$

57) $-4 \cdot 10^{x} = -10$

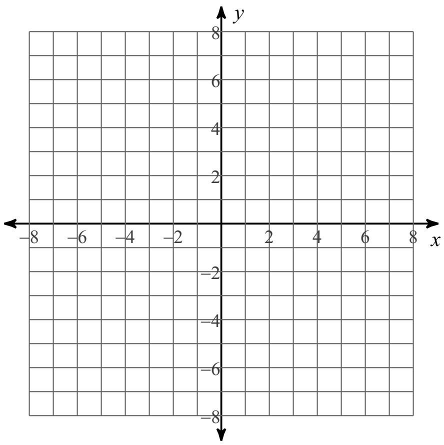
58) $-6 \cdot 10^{b-8} = -52$

59) $-4e^{k+10} = -60$

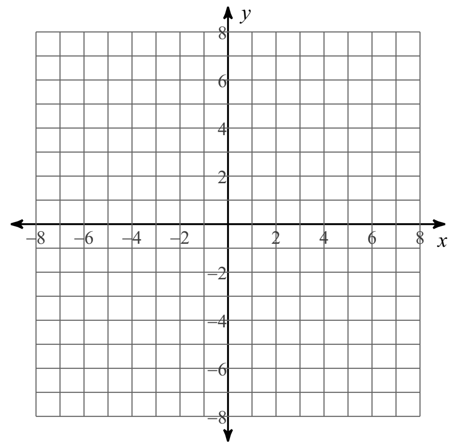
LOGARITHMIC FUNCTIONS

Reminder: To graph logarithmic functions, isolate the log, change the equation to exponential, identify transformations and sketch the graph. Make sure to show the vertical asymptote.

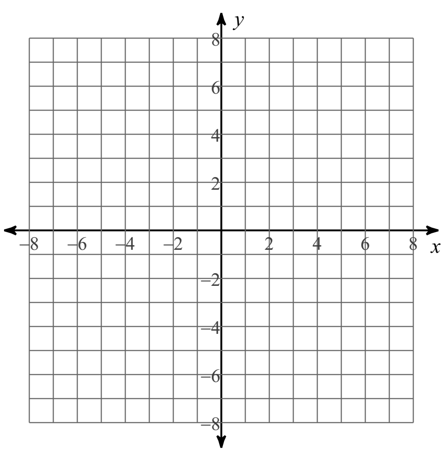
60) $y = \log_4 (x + 4) + 5$



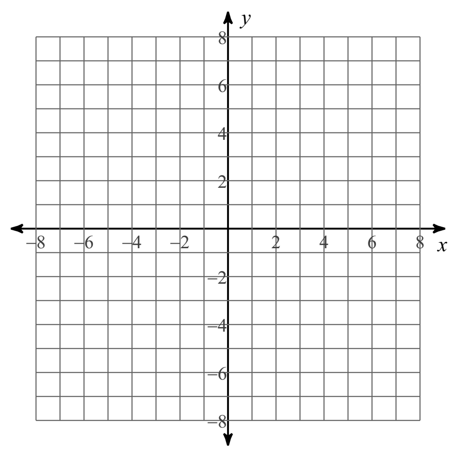
61) $y = \log (x - 1) - 2$



62) $y = \log_3 (x + 6) - 5$



63) $y = \ln (x + 3) + 5$



Evaluate each expression without the use of a calculator.

64) $\log_6 216$

65) $\log_4 64$

66) $\log_7 1$

67) $\log_7 \dfrac{1}{49}$

Solve each logarithmic equation. Give exact solution.

Reminder: If both sides of an equation contain one logarithmic term with the same base then the equation can be solved by setting the terms inside of the parenthesis equal to each other. If this is not the case, then use the properties of logarithms to condense the logarithms on one side of the equation. Convert the equation to exponential form and solve.

68) $\log_{20} (30 - 3v) = \log_{20} (v^2 - 4v)$

69) $5\log_3 (n + 8) = 20$

70) $-\ln (n - 6) + 3 = 0$

71) $\ln (x + 4) - \ln x = 4$

72) $\ln 2 + \ln (x^2 - 6) = 5$

73) $\log (x + 3) + \log x = 1$

PROPERTIES OF EXPONENTS

Simplify. Your answer should contain only positive exponents.

74) $\dfrac{(2x^2)^{-2}}{y \cdot 2x^{-4}y^4}$

75) $\dfrac{(x^2y^4)^2 \cdot 2y^2}{x^{-2}y^{-2}}$

76) $\dfrac{x^3y^{-3}}{(2x^{-4}y^4)^4 \cdot 2x^{-2}}$

77) $\dfrac{xy^3 \cdot x^3y^{-3}}{(2y)^{-2}}$

OPERATIONS WITH RADICALS

Simplify without the use of a calculator. Use absolute value signs when necessary.

78) $\sqrt[3]{-512x^3}$

79) $\sqrt{28a^3}$

80) $\sqrt{196ab^3}$

81) $\sqrt{24m^4n}$

Simplify.

82) $-3\sqrt{2}-\sqrt{8}$

83) $3\sqrt{6}+2\sqrt{54}-\sqrt{54}$

84) $-2\sqrt[3]{-9n^4}\cdot\sqrt[3]{9n}$

85) $\sqrt{6}\left(-5\sqrt{6}+\sqrt{10}\right)$

86) $\dfrac{-2+3\sqrt{5p^3}}{2\sqrt{18p}}$

87) $\dfrac{4k^4+4\sqrt{k^3}}{-4-\sqrt{2k}}$

Trigonometric Functions

Using radians, find the period of each function. Then graph one cycle on the negative side of the x-axis and one cycle to the right of the x-axis.

88) $y = \cos\theta$

89) $y = \sin\theta$

Using radians, find the period of each function. Graph at least three cycles. Include asymptotes.

90) $y = \cot\theta$

91) $y = \tan\theta$

Graph two cycles of the cosine or sine function first, one cycle on the negative side of the x-axis and one on the positive side of the x-axis. Graph asymptotes and then graph the secant or cosecant graph.

92) $y = \csc\theta$

93) $y = \sec\theta$

Find the exact value of each trigonometric function without a calculator. Show your work. If necessary find a coterminal angle. Find the reference angle, and lastly find whether the answer is positive or negative depending on the function and the quadrant the angle landed on.

94) $\sin 5\pi$

95) $\tan -\frac{29\pi}{6}$

96) $\csc -\frac{19\pi}{6}$

97) $\cot -\frac{25\pi}{6}$

98) $\sec -3\pi$

99) $\cos 0$

100) $\cot \pi$

101) $\sin \pi$

102) $\cos -\frac{9\pi}{2}$

103) $\sec -\frac{35\pi}{6}$

104) $\cos \frac{25\pi}{6}$

105) $\csc -\frac{19\pi}{4}$

OPERATIONS WITH RATIONAL EXPRESSIONS

Simplify each expression.

106) $\frac{4u}{4v} - \frac{2v}{5}$

107) $\frac{2}{3} - \frac{5}{6x^2y}$

Simplify each and state the excluded values.

108) $\frac{x^2 - 11x + 18}{x^2 - 4x + 3} \cdot \frac{x^2 + 4x - 21}{x^2 - 11x + 18}$

109) $\frac{9x - 36}{x^2 - 8x + 15} \div \frac{x^2 - 6x + 8}{x^2 - 7x + 10}$

COMPLEX FRACTIONS

Simplify each expression.

110) $\dfrac{a}{\frac{a}{4} + \frac{a}{2}}$

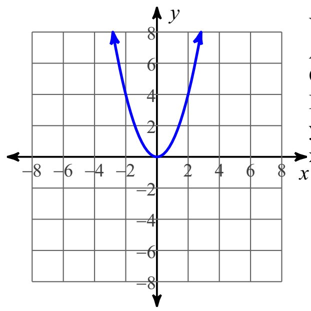
111) $\dfrac{\frac{3m - 4}{m} - \frac{3m - 4}{m^2}}{4}$

112) $\dfrac{\frac{x^2}{2}}{\frac{y + 1}{x} + \frac{4}{y + 1}}$

113) $\dfrac{\frac{n^2}{m}}{\frac{1}{m} + \frac{3m + 4}{n^2}}$

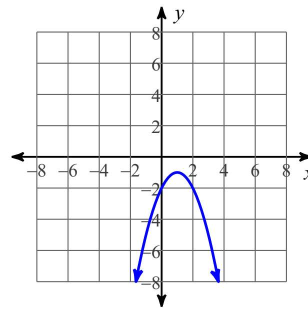
Answers to Part I (ID: 1)

1)



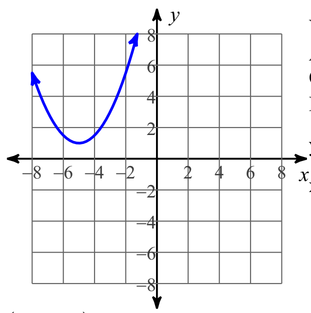
Vertex: $(0, 0)$
Axis of Sym.: $x = 0$
Opens: Up
Min value = 0
y-int: 0
x-int: 0

2)



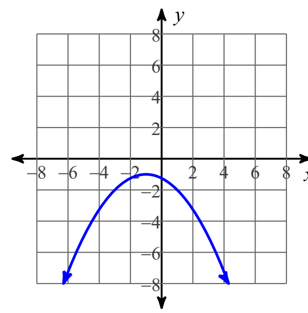
Vertex: $(1, -1)$
Axis of Sym.: $x = 1$
Opens: Down
Max value = -1
y-int: -2
x-int: None

3)



Vertex: $(-5, 1)$
Axis of Sym.: $x = -5$
Opens: Up
Min value = 1
y-int: $\frac{27}{2}$
x-int: None

4)



Vertex: $(-1, -1)$
Axis of Sym.: $x = -1$
Opens: Down
Max value = -1
y-int: $-\frac{5}{4}$
x-int: None

5) $\{1, -4\}$

6) $\{-2, 4\}$

7) $\left\{-\frac{1}{2}, 0\right\}$

8) $\left\{\frac{3}{2}, -2\right\}$

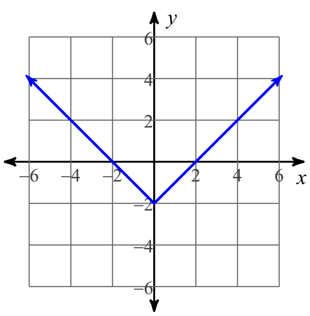
9) $\left\{\frac{i\sqrt{129}}{3}, -\frac{i\sqrt{129}}{3}\right\}$

10) $\{\sqrt{2}, -\sqrt{2}\}$

11) $\{-1, -3\}$

12) $\left\{\frac{31}{5}, -4\right\}$

13)



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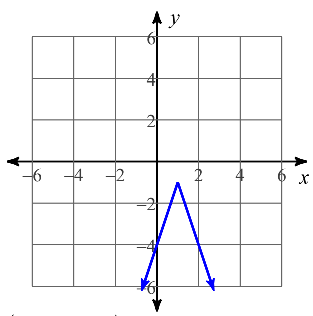

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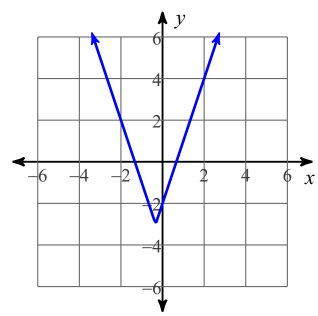
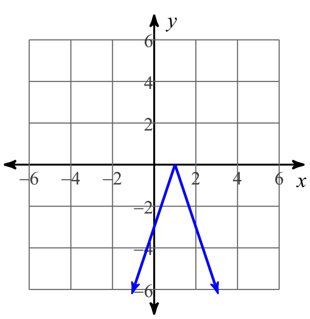


16)



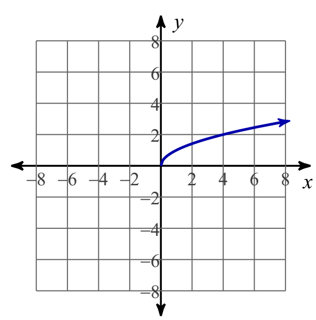
17) $\{10, -10\}$

18) $\{3, -11\}$

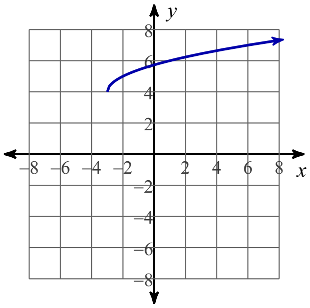
19) $k \geq 3$ or $k \leq -3$

20) $-7 \leq r \leq 7$

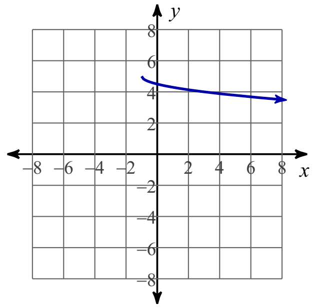
21)



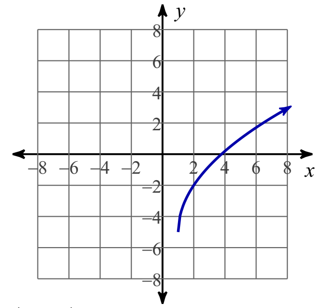
22)



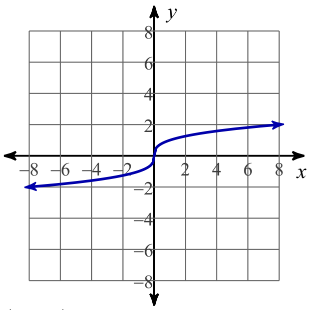
23)



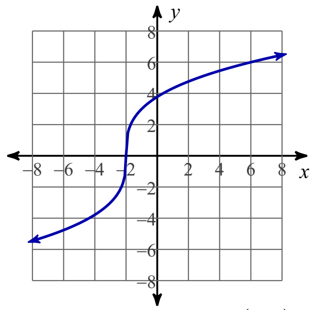
24)



25)



26)



27) $\{800\}$

28) $\{6, 3\}$

29) $\{10\}$

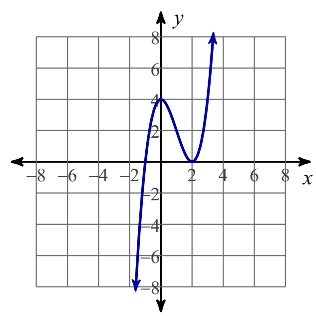
30) $\{27\}$

31) $\left\{-3, \frac{127}{41}\right\}$

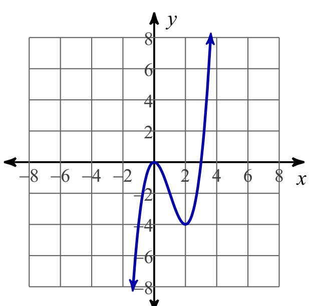
32) $\left\{-7, \frac{69}{8}\right\}$

33) $\{-6\}$

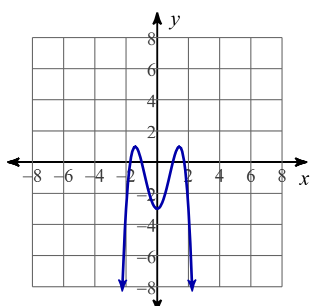
34)



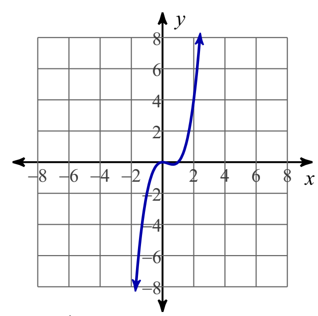
35)



36)



37)



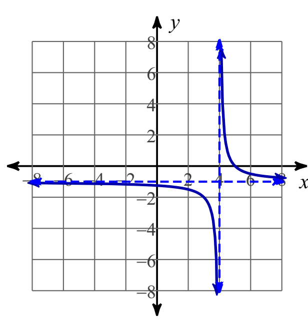
38) $\{4, \sqrt{2}, -\sqrt{2}\}$

39) $\{\sqrt{5}, -\sqrt{5}, 2i, -2i\}$

40) $\{2, -1 \text{ mult. } 2\}$

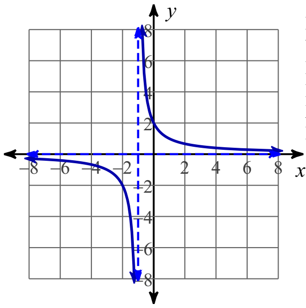
41) $\{-7, 1 \text{ mult. } 2\}$

42)



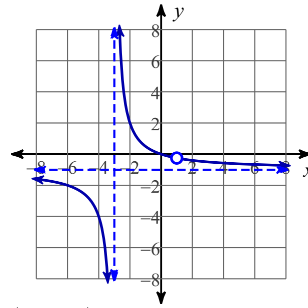
Discontinuities: 4
Vertical Asym.: $x = 4$
Holes: None
Horz. Asym.: $y = -1$
X-intercepts: 5
Domain:
All reals except 4

43)



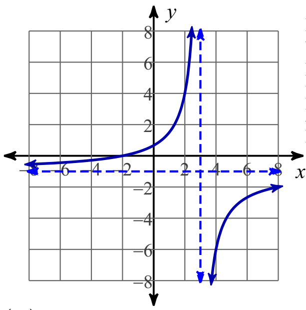
Discontinuities: -1
Vertical Asym.: $x = -1$
Holes: None
Horz. Asym.: $y = 0$
X-intercepts: None
Domain:
All reals except -1

44)



Discontinuities: -3, 1
Vertical Asym.: $x = -3$
Holes: $x = 1$
Horz. Asym.: $y = -1$
X-intercepts: 0
Domain:
All reals except -3, 1

45)



Discontinuities: 3
Vertical Asym.: $x = 3$
Holes: None
Horz. Asym.: $y = -1$
X-intercepts: -2
Domain:
All reals except 3

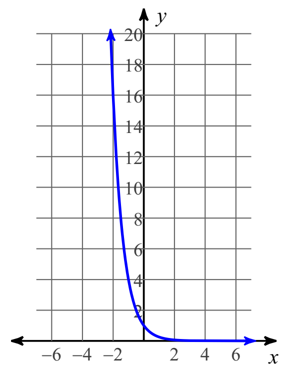
46) $\{8, -1\}$

47) $\left\{1, -\frac{1}{3}\right\}$

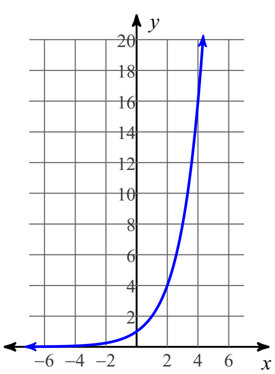
48) $\{4\}$

49) $\{4\}$

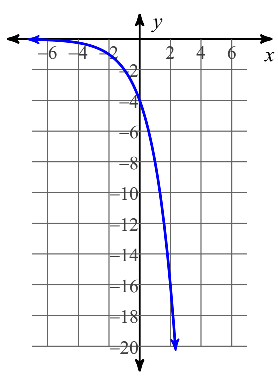
50)



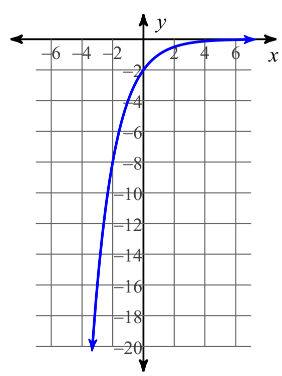
51)



52)



53)



54) $\left\{-\frac{4}{3}\right\}$

55) $\left\{\frac{5}{11}\right\}$

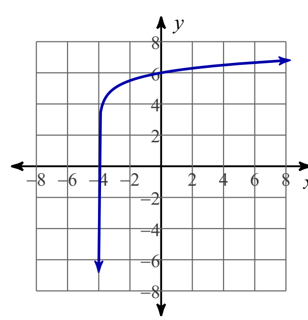
56) $-\frac{\ln 61}{6}$

57) $\log \frac{5}{2}$

58) $\log \frac{26}{3} + 8$

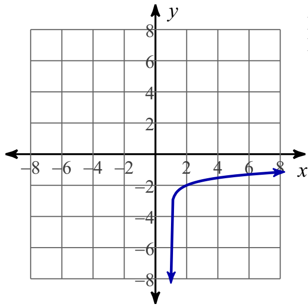
59) $\ln 15 - 10$

60)



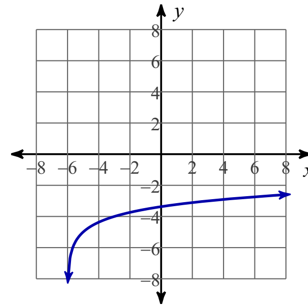
Domain: $x > -4$
Range: All reals

61)



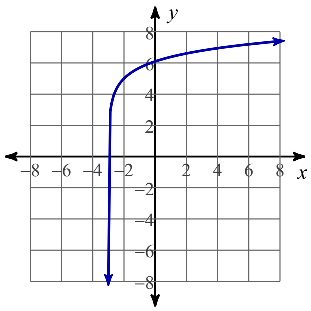
Domain: $x > 1$
Range: All reals

62)



Domain: $x > -6$
Range: All reals

63)



64) 3

65) 3

66) 0

67) -2

68) $\{-5, 6\}$

69) $\{73\}$

70) $\{e^3 + 6\}$

71) $\left\{-\frac{4}{1 - e^4}\right\}$

72) $\left\{\frac{\sqrt{2e^5 + 24}}{2}, -\frac{\sqrt{2e^5 + 24}}{2}\right\}$

73) $\{2\}$

74) $\frac{1}{8y^5}$

75) $2x^6y^{12}$

76) $\frac{x^{21}}{32y^{19}}$

77) $4y^2x^4$

78) $-8x$

79) $2|a|\sqrt{7a}$

80) $14|b|\sqrt{ab}$

81) $2m^2\sqrt{6n}$

82) $-5\sqrt{2}$

83) $6\sqrt{6}$

84) $6n\sqrt[3]{3n^2}$

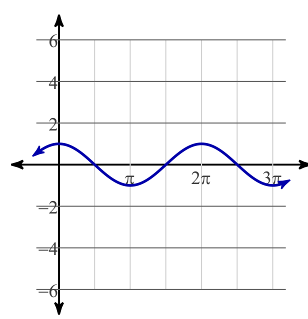
85) $-30 + 2\sqrt{15}$

86) $\frac{-2\sqrt{2p} + 3p^2\sqrt{10}}{12p}$

87) $\frac{-8k^4 + 2k^4\sqrt{2k} - 8k\sqrt{k} + 2k^2\sqrt{2}}{8 - k}$

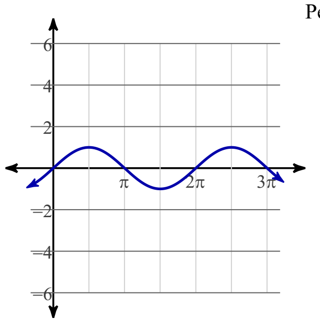
88)

Period: 2π



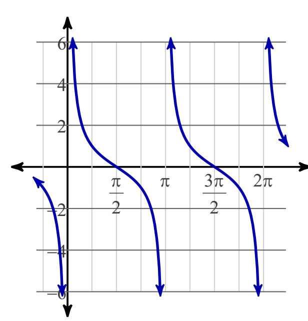
89)

Period: 2π

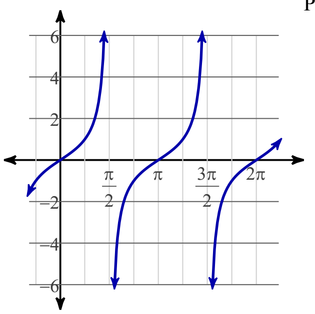


90)

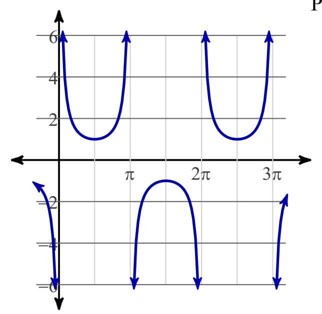
Period: π



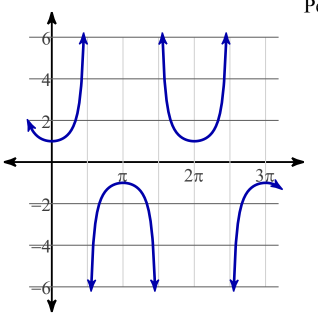
91) Period: π



92) Period: 2π



93) Period: 2π



94) 0

95) $\frac{\sqrt{3}}{3}$

96) 2

97) $-\sqrt{3}$

98) -1

99) 1

100) Undefined

101) 0

102) 0

103) $\frac{2\sqrt{3}}{3}$

104) $\frac{\sqrt{3}}{2}$

105) $-\sqrt{2}$

106) $\frac{5u - 2v^2}{5v}$

107) $\frac{4x^2y - 5}{6x^2y}$

108) $\frac{x + 7}{x - 1}$; $\{3, 1, 9, 2\}$

109) $\frac{9}{x - 3}$; $\{5, 3, 2, 4\}$

110) $\frac{4}{3}$

111) $\frac{3m^2 - 7m + 4}{4m^2}$

112) $\frac{x^3y + x^3}{2y^2 + 4y + 2 + 8x}$

113) $\frac{n^4}{n^2 + 3m^2 + 4m}$

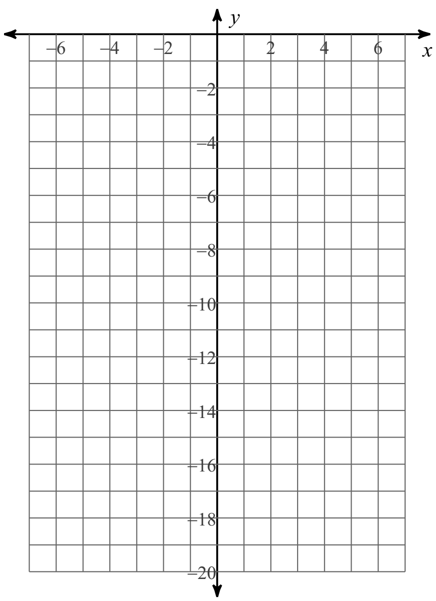
Summer Math Packet Name____________________ ID: 1

Part II

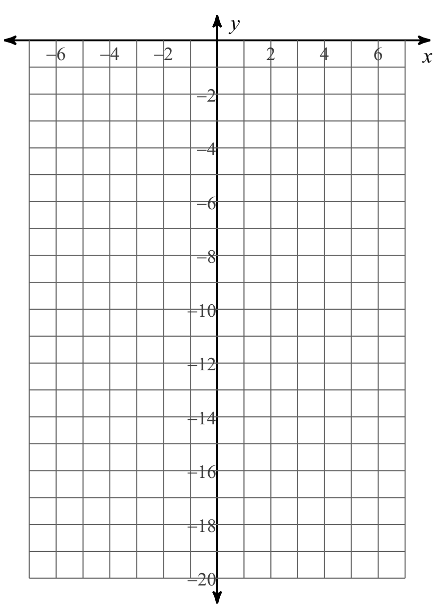
Date________________ Period____

For each function, determine the domain, range, intercepts, asymptotes, end behavior, and where the function is increasing or decreasing. Then sketch the graph.

1) $y = -3e^{x}$

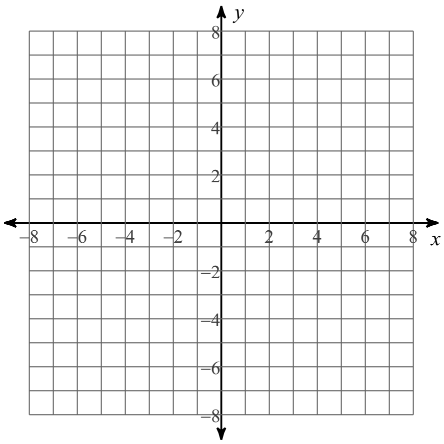


2) $y = -3 \cdot \left(\frac{1}{e}\right)^{x}$

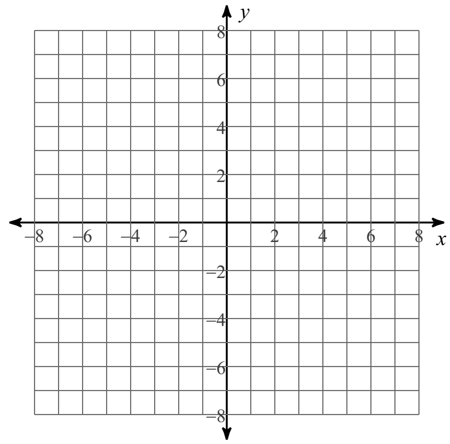


Sketch the graph of each function.

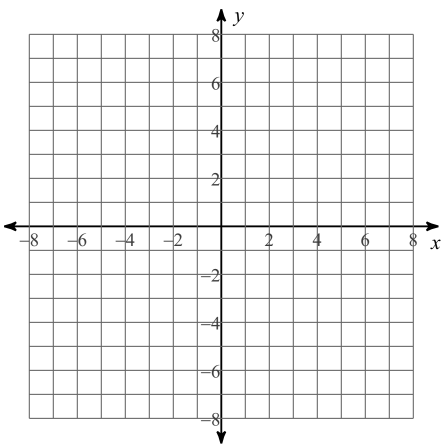
3) $g(x) = \begin{cases} -4^{x}, & x \le 1 \\ (x-2)^4, & x > 1 \end{cases}$



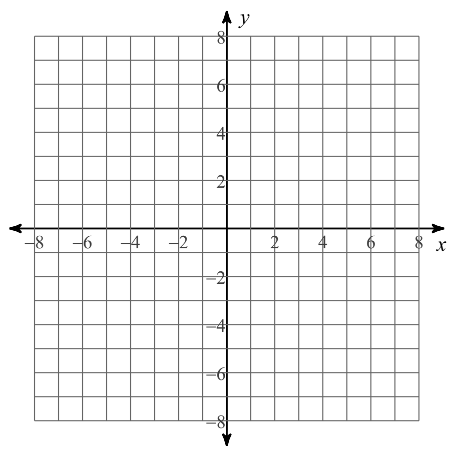
4) $f(x) = \begin{cases} (x-4)^2, & x \le 4 \\ -2, & x > 4 \end{cases}$



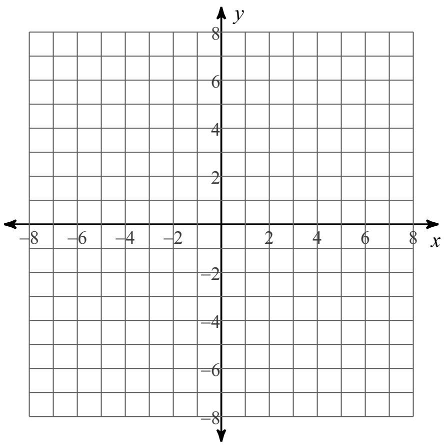
5) $w(x) = \begin{cases} -x + 4, & x \ne 3 \\ |x|, & x = 3 \end{cases}$



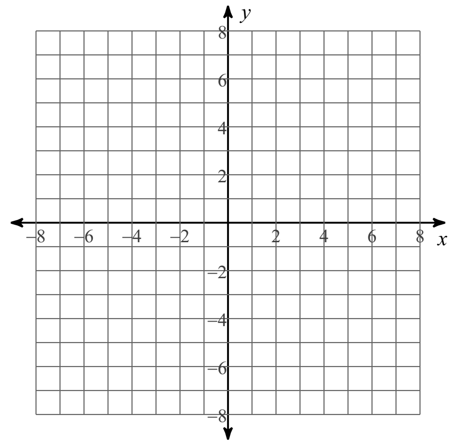
6) $f(x) = \begin{cases} (x+4)^2, & x \le -4 \\ 1 + \sqrt{x}, & -4 < x \le 1 \\ -\dfrac{1}{x}, & x > 1 \end{cases}$



7) $f(x) = \begin{cases} \frac{1}{x} - 3, & x < -3 \\ \frac{|x|}{2}, & x \geq -3 \end{cases}$



8) $f(x) = \begin{cases} (x+2)^2, & x \leq -1 \\ 4^x - 3, & x > -1 \end{cases}$



Find the inverse of each function.

9) $g(x) = 6x - 2$

10) $f(x) = 1 + 2x^5$

Perform the indicated operation.

11) $g(x) = x^2 - 5x$
$f(x) = 2x + 1$
Find $(g \cdot f)(x)$

12) $g(a) = 4a + 3$
$h(a) = -2a^2 - 5$
Find $(-2g - 2h)(a)$

13) $g(a) = 2a$
$f(a) = 4a + 2$
Find $(g \circ f)(-3)$

14) $f(n) = n^3 + 2$
$g(n) = -2n + 2$
Find $(f \circ g)(3)$

15) $f(n) = -3n + 2$
$g(n) = 4n + 4$
Find $(f \circ g)(n^2)$

16) $f(t) = t + 2$
$g(t) = t^2 - 4$
Find $(f \circ g)(-3 + t)$

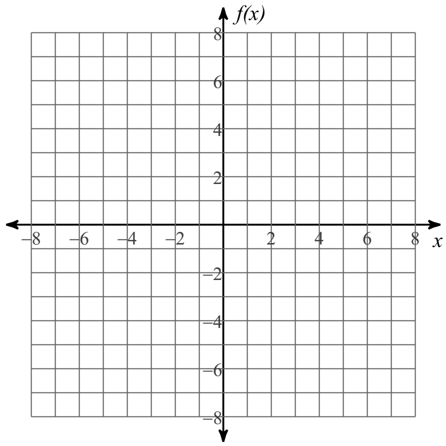
Find f and g so that $h(x) = (f \circ g)(x)$. Neither function may be the identity function $f(x) = x$.

17) $h(x) = 3^{2\sqrt{x}}$

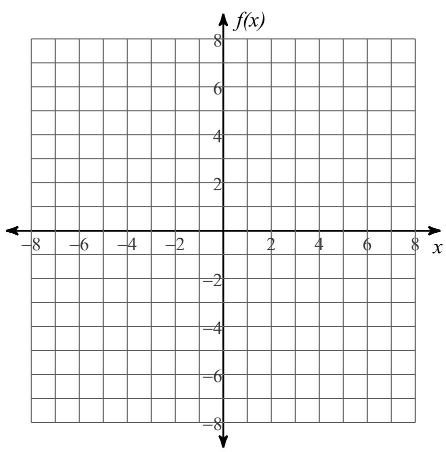
18) $h(x) = 4\left(\frac{x}{5} + 1\right) + 3$

Consider each power function. Determine the domain and range, intercepts, end behavior, continuity, and regions of increase and decrease. Then sketch the graph.

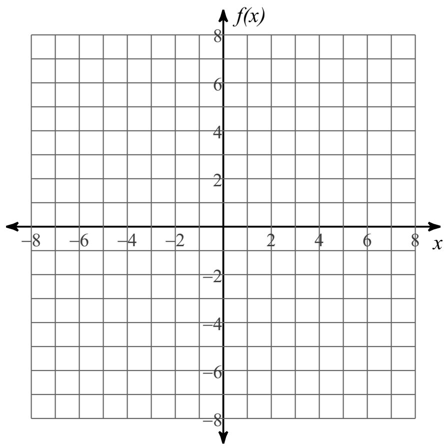
19) $f(x) = x^4$



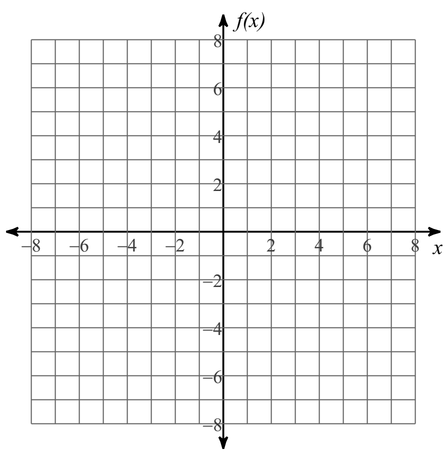
20) $f(x) = \frac{1}{3}x^5$



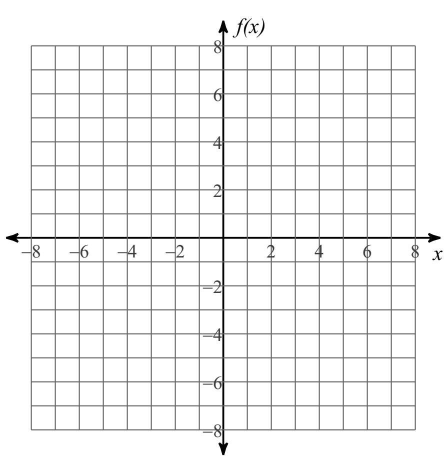
21) $f(x) = \frac{1}{3}x^{-9}$



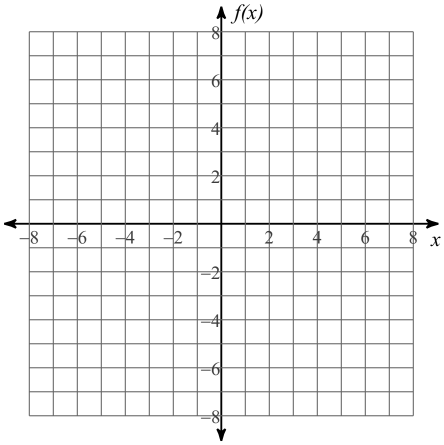
22) $f(x) = 7x^{-8}$



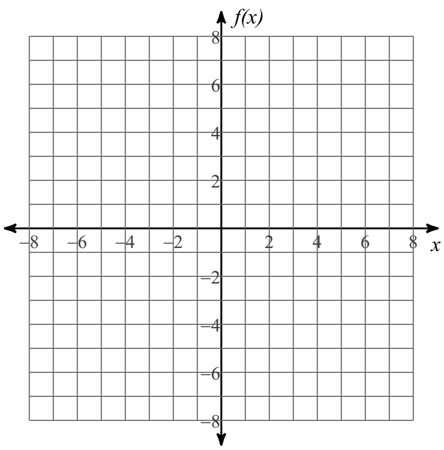
23) $f(x) = 5x^{\frac{3}{4}}$



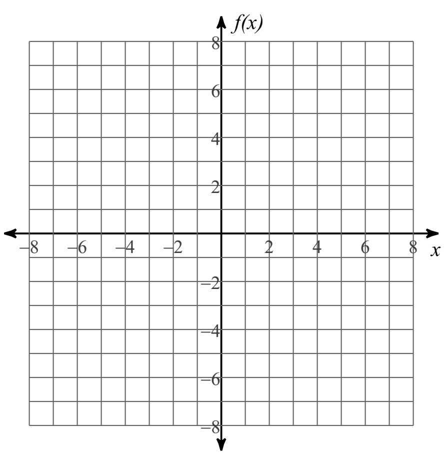
24) $f(x) = 4x^{\frac{7}{6}}$



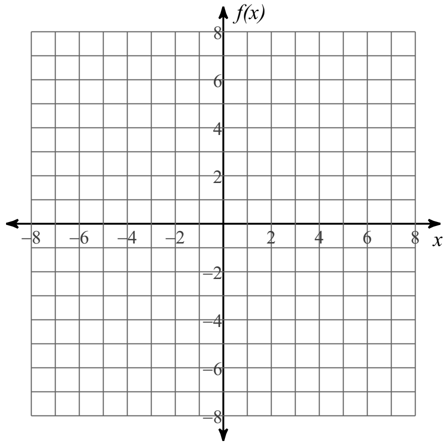
25) $f(x) = 4x^{\frac{7}{3}}$



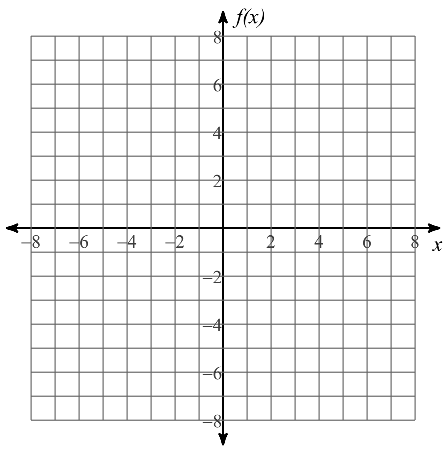
26) $f(x) = 2x^{\frac{3}{5}}$



27) $f(x) = 2x^{\frac{4}{3}}$



28) $f(x) = 4x^{\frac{4}{7}}$



Expand completely using the Binomial Theorem and/or Pascal's Triangle.

29) $(4y - 1)^4$

Divide. Write your answer in fraction form.

30) $(18x^4 + 30x^3 - 4x^2 + 17x) \div (3x + 1)$

Solve each equation for $0 \leq \theta < 2\pi$.

31) $1 = \cos^2 \theta$

32) $3 + \sec \theta = \sec^2 \theta + 1$

33) $1 + 2\cot \theta = -\cot^2 \theta$

34) $4\csc^2 \theta + 2 = 5\csc^2 \theta$

35) $\tan^2 \theta - 2\tan \theta = -1$

36) $-7\cos^2 \theta + 1 = -3\cos^2 \theta$

37) $-4 = -7 + 4\sin^2 \theta$

38) $-\tan^2 \theta = 1 + 2\tan \theta$

39) $-2\sin \theta - \cos^2 \theta + 2 = 0$

40) $3\sec \theta = -\tan^2 \theta - 3$

Use the sum/difference identities to find the exact value of each.

41) $\sin \frac{7\pi}{12}$

42) $\cos \frac{\pi}{12}$

43) $\tan -\frac{\pi}{12}$

Find the exact value of each expression.

44) $\sin^{-1}(0)$

45) $\cos^{-1}(0)$

46) $\sin^{-1}(1)$

47) $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

48) $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

49) $\cos^{-1}\left(\frac{\sqrt{2}}{2}\right)$

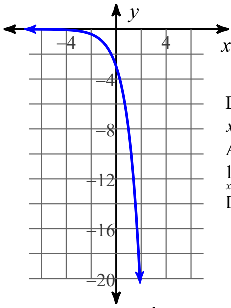
50) $\tan^{-1}(-1)$

51) $\tan^{-1}(\sqrt{3})$

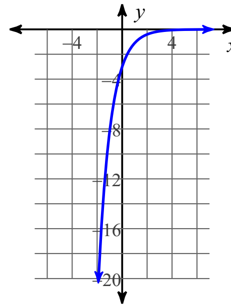
52) $\cos^{-1}\left(-\frac{1}{2}\right)$

53) $\tan^{-1}(-\sqrt{3})$

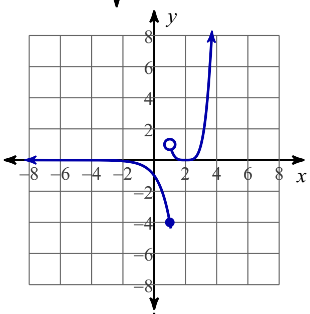
Answers to Part II (ID: 1)

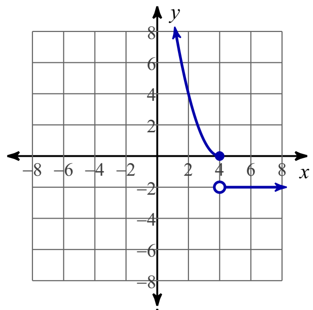
1) 

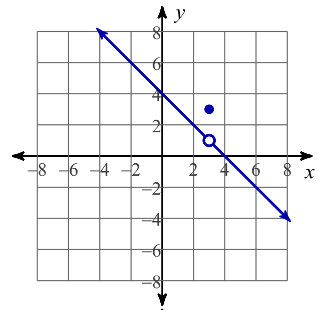
Domain: (-∞, ∞) Range: (-∞, 0)
x-intercept: none y-intercept: −3
Asymptote: $y = 0$
$\lim_{x\to\infty} y = -\infty$ $\lim_{x\to-\infty} y = 0$
Decreasing on: (-∞, ∞)

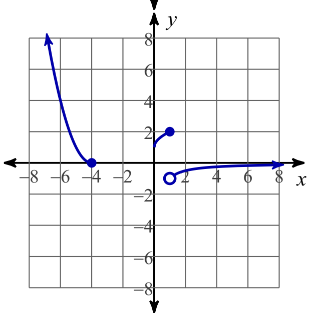
2) 

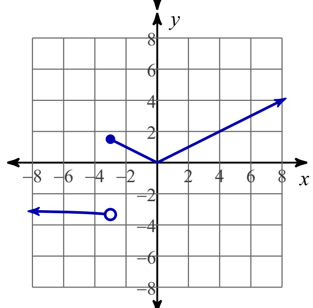
Domain: (-∞, ∞) Range: (-∞, 0)
x-intercept: none y-intercept: −3
Asymptote: $y = 0$
$\lim_{x\to\infty} y = 0$ $\lim_{x\to-\infty} y = -\infty$
Increasing on: (-∞, ∞)

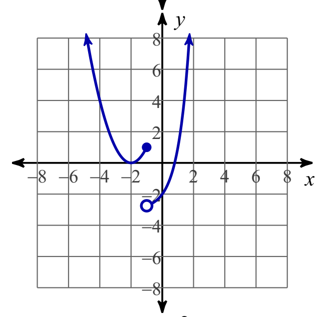
3) 

4) 

5) 

6) 

7) 

8) 

9) $g^{-1}(x) = \dfrac{x+2}{6}$

10) $f^{-1}(x) = \sqrt[5]{\dfrac{x-1}{2}}$

11) $2x^3 - 9x^2 - 5x$

12) $4a^2 - 8a + 4$

13) -20

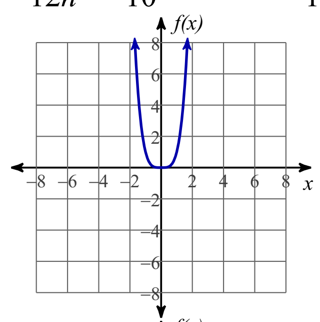
14) -62

15) $-12n^2 - 10$

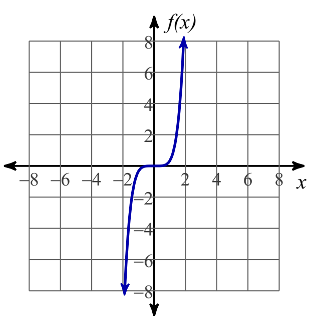
16) $t^2 - 6t + 7$

17) $f(x) = 3^x$
$g(x) = 2\sqrt{x}$

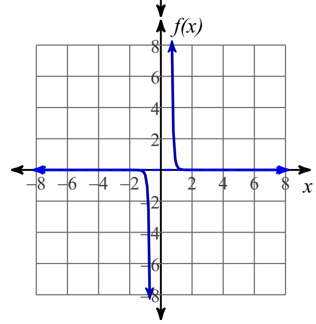
18) $f(x) = 4x + 3$
$g(x) = \dfrac{x}{5} + 1$

19) 

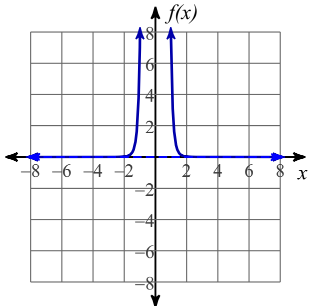
Domain: $(-\infty, \infty)$
Range: $[0, \infty)$
x-intercept: 0 y-intercept: 0
$\lim_{x\to-\infty} f(x) = \infty$ $\lim_{x\to\infty} f(x) = \infty$
Continuous on $(-\infty, \infty)$
Increasing: $(0, \infty)$
Decreasing: $(-\infty, 0)$

20) 

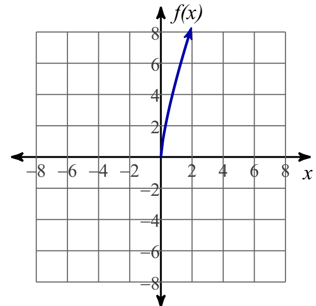
Domain: $(-\infty, \infty)$
Range: $(-\infty, \infty)$
x-intercept: 0 y-intercept: 0
$\lim_{x\to-\infty} f(x) = -\infty$ $\lim_{x\to\infty} f(x) = \infty$
Continuous on $(-\infty, \infty)$
Increasing: $(-\infty, \infty)$

21) 

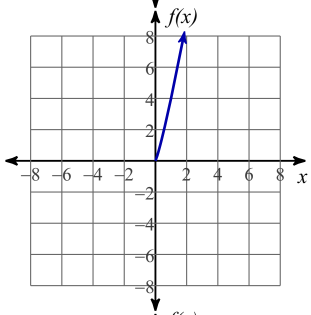
Domain: $(-\infty, 0) \cup (0, \infty)$
Range: $(-\infty, 0) \cup (0, \infty)$
No intercepts
$\lim_{x\to-\infty} f(x) = 0$ $\lim_{x\to\infty} f(x) = 0$
Infinite discontinuity at $x = 0$
Decreasing: $(-\infty, 0)$, $(0, \infty)$

22) 

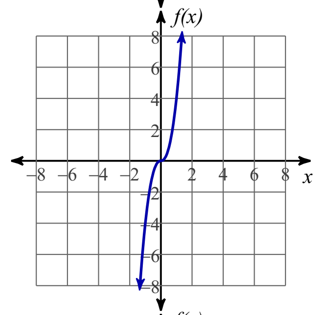
Domain: $(-\infty, 0) \cup (0, \infty)$
Range: $(0, \infty)$
No intercepts
$\lim_{x \to -\infty} f(x) = 0 \quad \lim_{x \to \infty} f(x) = 0$
Infinite discontinuity at $x = 0$
Increasing: $(-\infty, 0)$
Decreasing: $(0, \infty)$

23) 

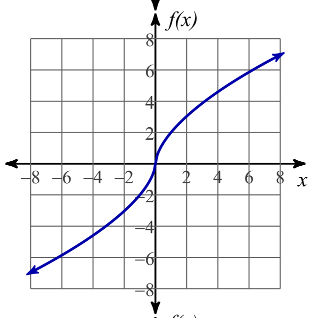
Domain: $[0, \infty)$
Range: $[0, \infty)$
x-intercept: 0 y-intercept: 0
$\lim_{x \to \infty} f(x) = \infty$
Continuous on $[0, \infty)$
Increasing: $(0, \infty)$

24) 

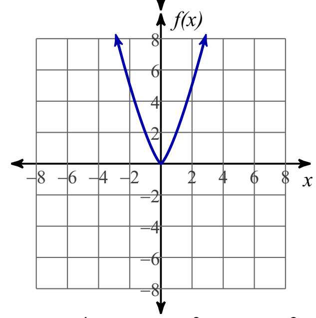
Domain: $[0, \infty)$
Range: $[0, \infty)$
x-intercept: 0 y-intercept: 0
$\lim_{x \to \infty} f(x) = \infty$
Continuous on $[0, \infty)$
Increasing: $(0, \infty)$

25) 

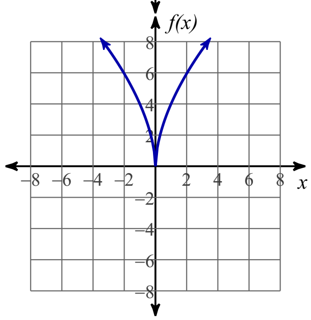
Domain: $(-\infty, \infty)$
Range: $(-\infty, \infty)$
x-intercept: 0 y-intercept: 0
$\lim_{x \to -\infty} f(x) = -\infty \quad \lim_{x \to \infty} f(x) = \infty$
Continuous on $(-\infty, \infty)$
Increasing: $(-\infty, \infty)$

26) 

Domain: $(-\infty, \infty)$
Range: $(-\infty, \infty)$
x-intercept: 0 y-intercept: 0
$\lim_{x \to -\infty} f(x) = -\infty \quad \lim_{x \to \infty} f(x) = \infty$
Continuous on $(-\infty, \infty)$
Increasing: $(-\infty, \infty)$

27) 

Domain: $(-\infty, \infty)$
Range: $[0, \infty)$
x-intercept: 0 y-intercept: 0
$\lim_{x \to -\infty} f(x) = \infty \quad \lim_{x \to \infty} f(x) = \infty$
Continuous on $(-\infty, \infty)$
Increasing: $(0, \infty)$
Decreasing: $(-\infty, 0)$

28) 

Domain: $(-\infty, \infty)$
Range: $[0, \infty)$
x-intercept: 0 y-intercept: 0
$\lim_{x \to -\infty} f(x) = \infty \quad \lim_{x \to \infty} f(x) = \infty$
Continuous on $(-\infty, \infty)$
Increasing: $(0, \infty)$
Decreasing: $(-\infty, 0)$

29) $256y^4 - 256y^3 + 96y^2 - 16y + 1$

30) $6x^3 + 8x^2 - 4x + 7 - \frac{7}{3x + 1}$

31) $\{0, \pi\}$

32) $\left\{\frac{\pi}{3}, \pi, \frac{5\pi}{3}\right\}$

33) $\left\{\frac{3\pi}{4}, \frac{7\pi}{4}\right\}$

34) $\left\{\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}\right\}$

35) $\left\{\frac{\pi}{4}, \frac{5\pi}{4}\right\}$

36) $\left\{\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}\right\}$

37) $\left\{\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}\right\}$

38) $\left\{\frac{3\pi}{4}, \frac{7\pi}{4}\right\}$

39) $\left\{\frac{\pi}{2}\right\}$

40) $\left\{\frac{2\pi}{3}, \pi, \frac{4\pi}{3}\right\}$

41) $\frac{\sqrt{6} + \sqrt{2}}{4}$

42) $\frac{\sqrt{6} + \sqrt{2}}{4}$

43) $\sqrt{3} - 2$

44) 0

45) $\frac{\pi}{2}$

46) $\frac{\pi}{2}$

47) $-\frac{\pi}{3}$

48) $\frac{3\pi}{4}$

49) $\frac{\pi}{4}$

50) $-\frac{\pi}{4}$

51) $\frac{\pi}{3}$

52) $\frac{2\pi}{3}$

53) $-\frac{\pi}{3}$