PRE-CALCULUS SUMMER PACKET

2019-2020

Your name: _____

Pre-Calculus is a fast paced and rigorous course. The point of this packet is to refresh your skills that you should already have mastered from previous courses. If you do not know, remember, or understand concepts within this packet, you are expected to take some time over summer looking them up on Khan Academy or some other resource.

- The topics in this packet are considered **prerequisite skills**. You should be comfortable with all of these types of problems before the first day of class.
- In general, you must know how to do all these problems WITHOUT a calculator.
- You should know the difference between a rounded value and an exact value.
  All answers in this packet and in the course should be answered exactly. For example you should write π, not 3.14, 1/3 not .3333 and $\sqrt{5}$, not 2.236. **All fractions and radicals should be in simplest form and should be left as improper fractions (like $\frac{5}{4}$), not mixed fractions (like $1\ \frac{1}{4}$)**.

Expectations: You may collaborate with others, look things up on google, consult old notes, textbooks, etc., but all of your work on this packet must be your own. You know the difference between working together and copying. Do your own work!

How will this packet be graded?

- You will have an assessment on the concepts included in this packet in the first week or two of school. **This is considered a summative assessment of prerequisite skills and may NOT be retaken.**

- This packet is due on the day of the quiz and will count as a homework grade.

Order of Operations

Simplify each expression.

a. $\frac{8}{5-1}(3-6)^2(4)$

b. $12 \div 2(4+3)$

c. $16 \div 2[8-3(4-2)]+1$

d. $-\frac{3}{2}+\frac{5}{4}-\frac{5}{6}$

e. $\frac{4}{3}-\frac{6}{5}+\frac{9}{10}$

f. $\frac{1}{5}-\frac{2}{5}\cdot\frac{15}{8}$

g. $\frac{2}{3}+\frac{7}{12}\div\frac{21}{4}$

Solving Equations

Solve each equation for x.

a. $8x-(2x-1)=3x-10$

b. $23-10(3-x)=15+5(2x)$

c. $Q=\frac{c+x}{2}$

d. $\frac{2x-3}{6}=\frac{x+9}{4}$

e. $-8(x-3)=4(6-5x)$

f. $c=ax+d$

Function Families

Write the name of the parent function next to each equation.

_____ $f(x) = x^3$	Linear
_____ $g(x) = \|x\|$	Cube Root
_____ $h(x) = x$	Absolute Value
_____ $j(x) = \frac{1}{x}$	Cube
_____ $k(x) = \sqrt{x}$	Rational
_____ $m(x) = 2^x$	Quadratic
_____ $n(x) = x^2$	Exponential
_____ $p(x) = \sqrt[3]{x}$	Logarithmic
_____ $q(x) = \log x$	Square Root

Using the parent equations above, describe the transformations that would happen to the functions below.

Example: $y = \sqrt{x+4} - 5$ | $y = \sqrt{x}$ is moved left 4 units and down 5.

1. $y = 3(x+2)^3$	2. $y = \frac{2}{3}x^2 + 8$
3. $y = \sqrt[3]{x+6} + 1$	4. $y = 2(x-6)^2 - 4$
5. $y = -2^{x-5} + 6$	6. $y = -\|x+3\| - 2$
7. $y = \log(x-7) + 1$	8. $y = \frac{1}{x+2} + 5$

Write the equation from the given parent function and transformations.

1) Quadratic; Up 3 and Left 7

2) Absolute Value; Reflection over the *x*-axis and Right 2

3) Cubed Root; Down 4 and Right 1

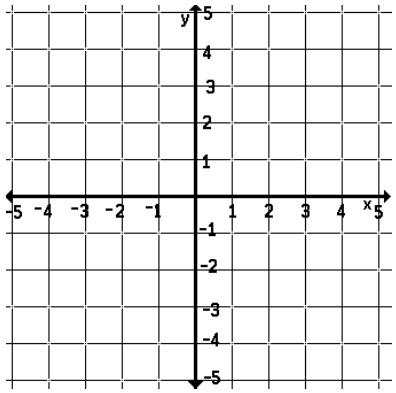
4) Square Root; Down 2, Reflection over the *x*-axis

5) Square Root; Right 1 and Up 3

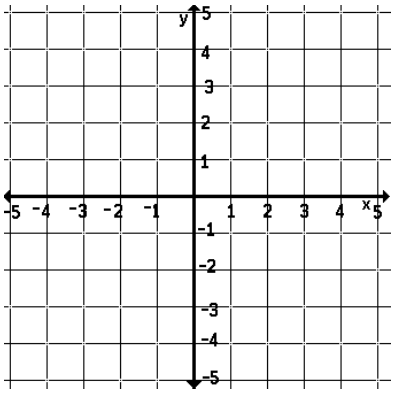
Graph each function by plotting 3-5 points, accurately.

Graph asymptotes when necessary.

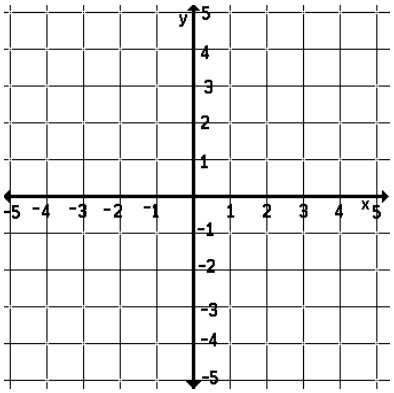
1. $y = \frac{1}{x}$



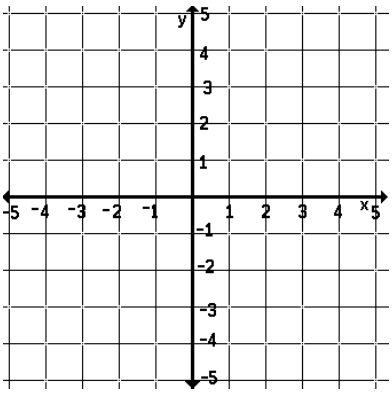
2. $y = x^2$



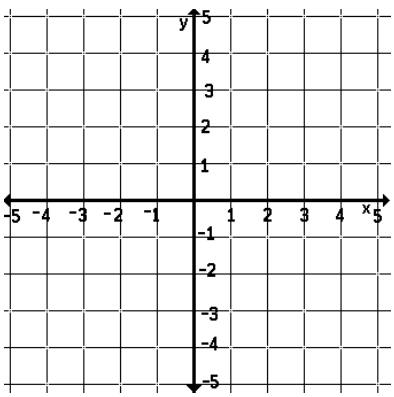
3. $y = \sqrt{x}$



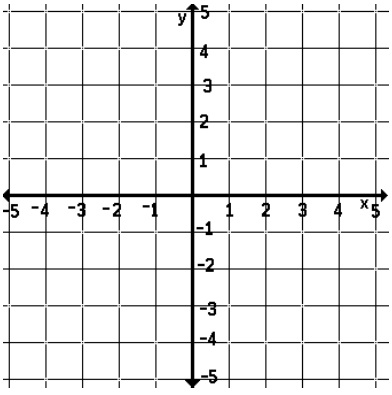
5. $y = |x|$



6. $y = \sqrt[3]{x}$

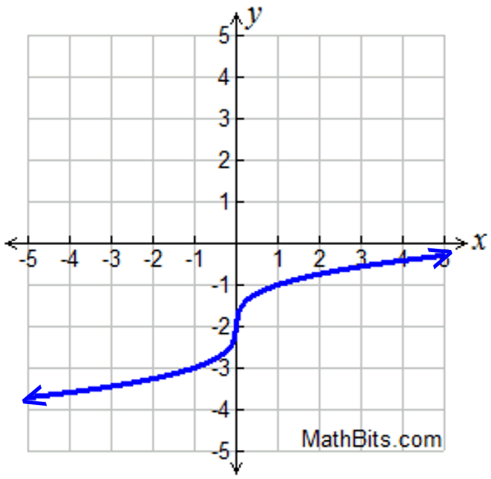


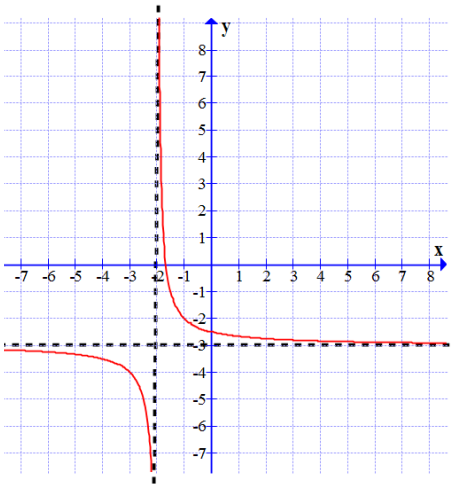
7. $y = x^3$

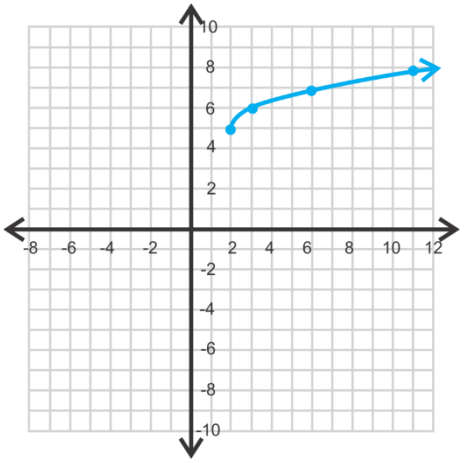


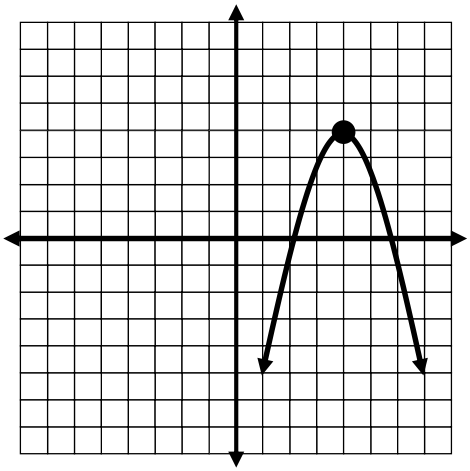
For each of the given graphs, write the EQUATION that would create that graph.

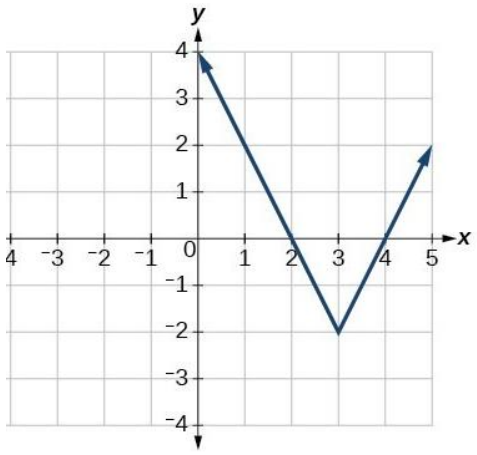
- Graphs are approximately drawn to scale.
- There are NO Vertical Shrinks or Stretches from the parent function.
- Focus on the important point of each function based on its parent function.

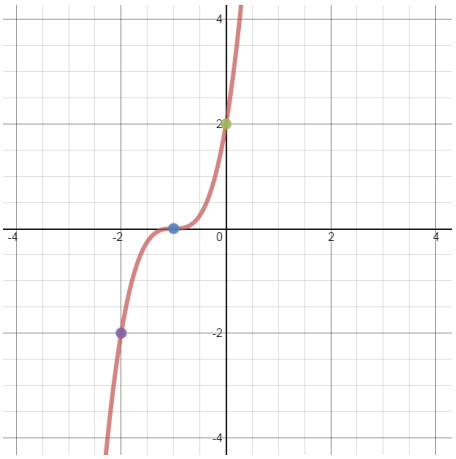








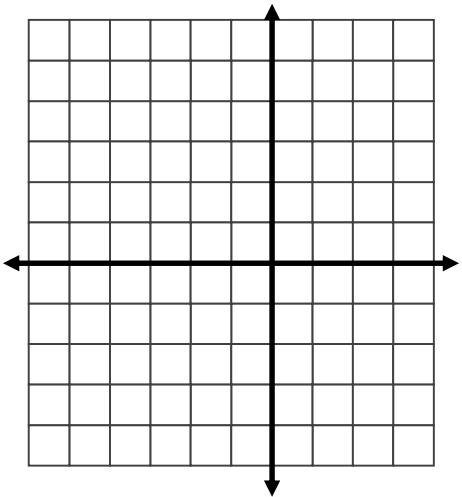




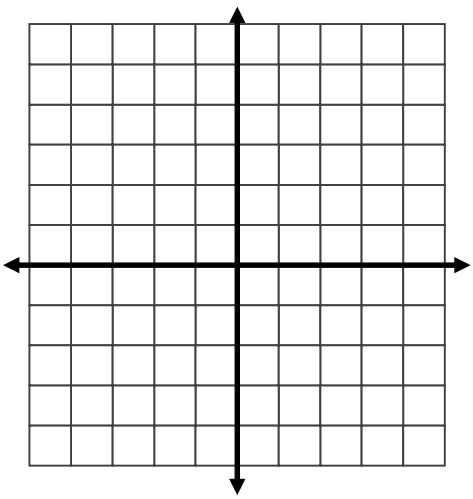
Graph each function by plotting 3-5 points, accurately.

Graph asymptotes when necessary.

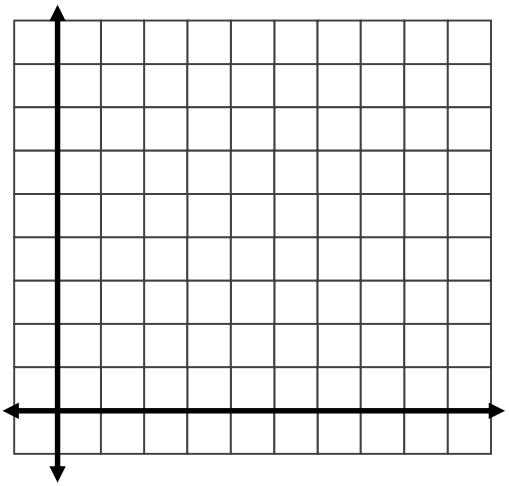
1) $y = |x + 3| - 2$



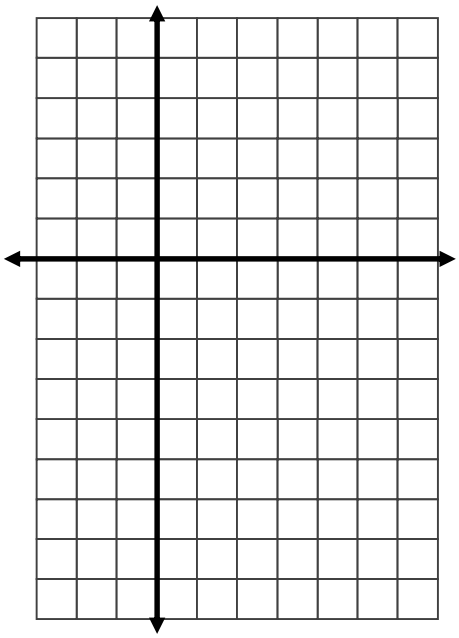
2) $g(x) = 4$



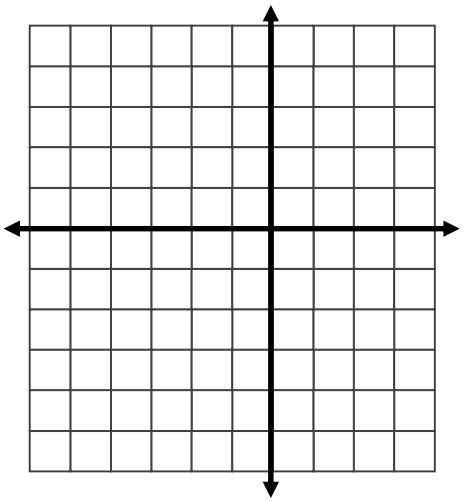
3) $f(x) = \sqrt{x - 1}$



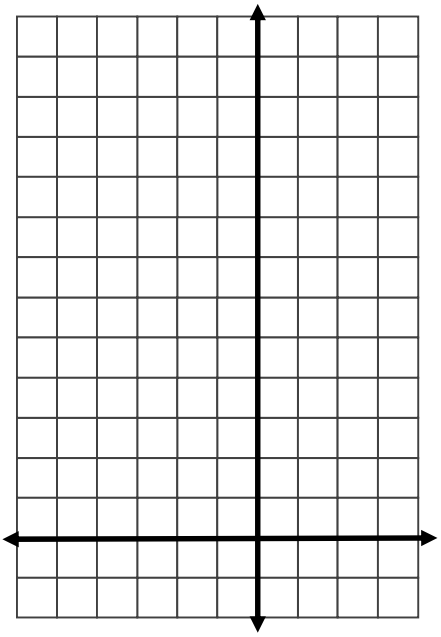
4) $h(x) = x^3 - 4$



5) $j(x) = \frac{1}{x+2} + 1$



6) $k(x) = (x+4)^2 + 3$



Interval Notation

<u>Convert the following descriptions of numbers into interval notation.</u>

1. All positive numbers not including 0.

2. Every number between -1 and 1 including -1 but not 1.

3. Every number between 1 and 5 not including 2 or 3, but including 1 and 5.

4. Every number greater than 5, not including 5.

5. All real numbers except 1.

Translate the following inequalities into interval notation.

6. $-4 < x \leq 5$

7. $x > 0$

8. $-\infty < x \leq 4 \; or \; 5 < x < \infty$

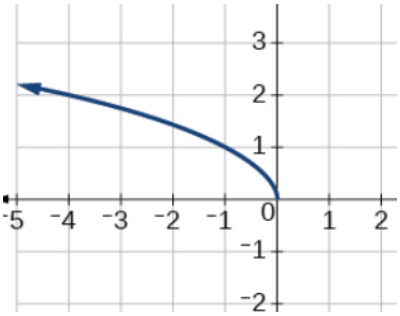
9. $x \geq 6$

Interpreting the Graph of a Function

Write the domain and range of the function using interval notation.

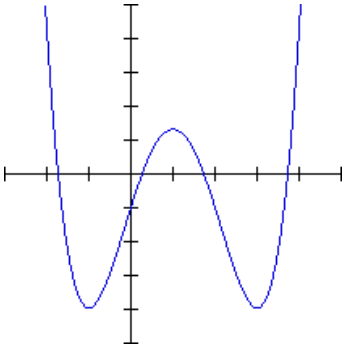
1. Domain:

   Range:



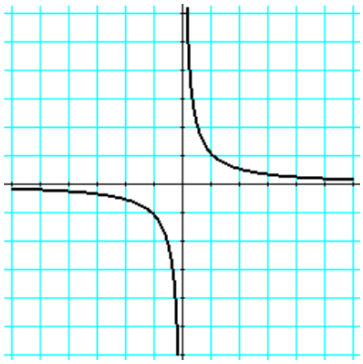
2. Domain:

   Range:



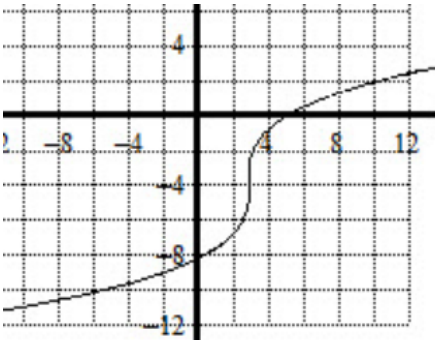
3. Domain:

   Range:



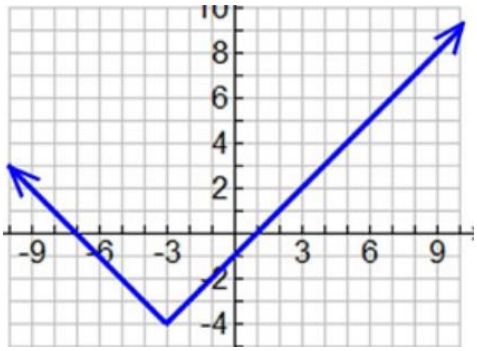
4. Domain:

   Range:



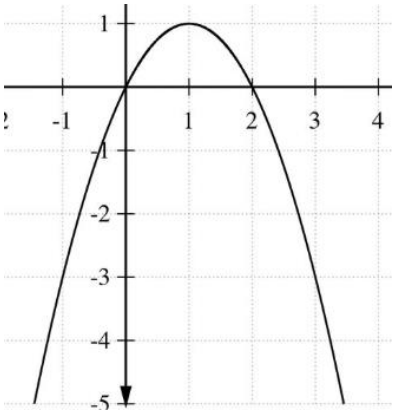
5. Domain:

   Range:



6. Domain:

   Range:



Use the given graph of function *f* to answer the following questions.

1. Find $f(0)$, $f(5)$ and $f(-3)$.

2. Find the value(s) of x if $f(x) = 2$

3. For what number(s) of x is $f(x) = 0$? What are these points called?

4. What is the y-intercept?

5. How often does the line $y = 1$ intersect the graph?

6. What is the domain of f?

7. What is the range of f?

8. On what interval(s) is the function increasing?

9. On what interval(s) is the function decreasing?

10. On what interval(s) is the function constant?

11. What is the local maximum?

Solving Quadratic Equations

Solve each equation by factoring.

a. $9x^2 - 27x = 0$

b. $25p^2 - 36 = 0$

c. $3d^2 - 16d - 12 = 0$

Rational Expressions

Simplify each expression and state the excluded value(s).

1. $\dfrac{2a^2 + 10a}{3a^2 + 15a}$

2. $\dfrac{p^2 - 3p - 10}{p^2 + p - 2}$

3. $\dfrac{x^2 + x - 6}{x^2 + 8x + 15}$

Simplify each expression and state the excluded value(s).

1. $\dfrac{x^2+8x+12}{3x-15} \cdot \dfrac{x^2-25}{x^2+12x+36}$

2. $\dfrac{x^2+4x+3}{2x+14} \cdot \dfrac{x^2+6x-7}{x^2+5x+6}$

3. $\frac{x^2+2x-15}{x^2-16} \div \frac{x+1}{3x-12}$

4. $\frac{x^2}{x^2+2x+1} \div \frac{3x}{x^2-1}$

5. $\frac{3}{x+6} + \frac{7}{x-2}$

6. $\frac{4}{x+1} - \frac{2}{x+2}$

Dividing Polynomials

Divide each polynomial using long division.

1. $(x^2 - 7x - 30) \div (x + 3)$

2. $(2x^2 + 5x - 12) \div (x + 4)$

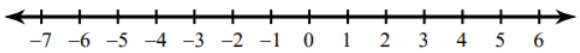
3. $(x^2 - 7x - 8) \div (x - 2)$

4. $(6x^3 + 4x^2 + x - 1) \div (3x - 1)$

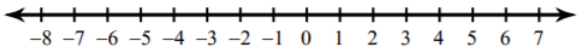
Compound Inequalities

Solve each compound inequality and graph its solution.

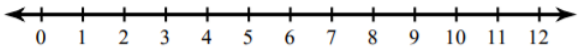
1) $n + 1 \leq -3$ or $-4n < -8$



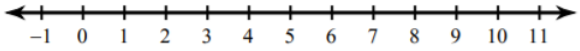
2) $\frac{k}{4} \geq 1$ or $\frac{k}{3} \leq -1$



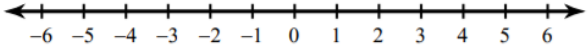
3) $2 < 2x < 6$



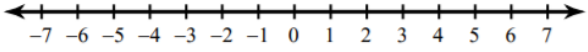
4) $6 \leq x + 6 \leq 11$



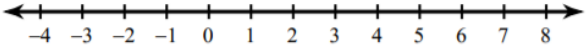
5) $-3 < m - 5 < -1$



6) $p + 4 \leq 1$ or $p - 1 \geq 1$



7) $-33 \leq -7n - 12 < -26$



8) $9 + 2b < 7$ or $7 - 5b < -8$