Summer Pre-Calculus review for AP Calculus AB
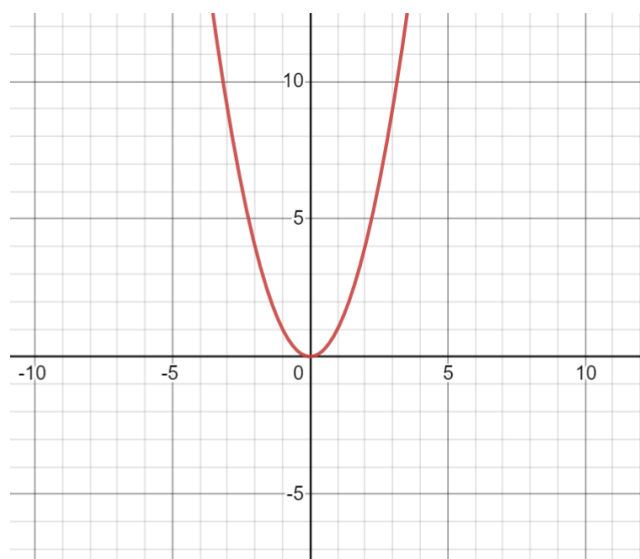
Name:_____   **due on/before August 24, 2022**

On the graph with the parent function draw and label a sketch of each additional equation in the family. Check your sketch with the graphing calculator.
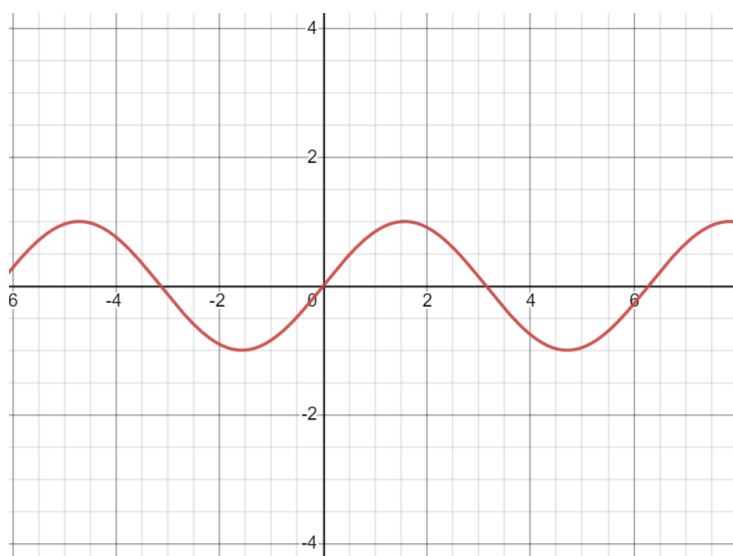
1)   Parent Function: $y = x^2$

a) $y = x^2 - 5$
b) $y = (x-10)^2$
c) $y = -2x^2$
d) $y = -(x+3)^2 + 6$

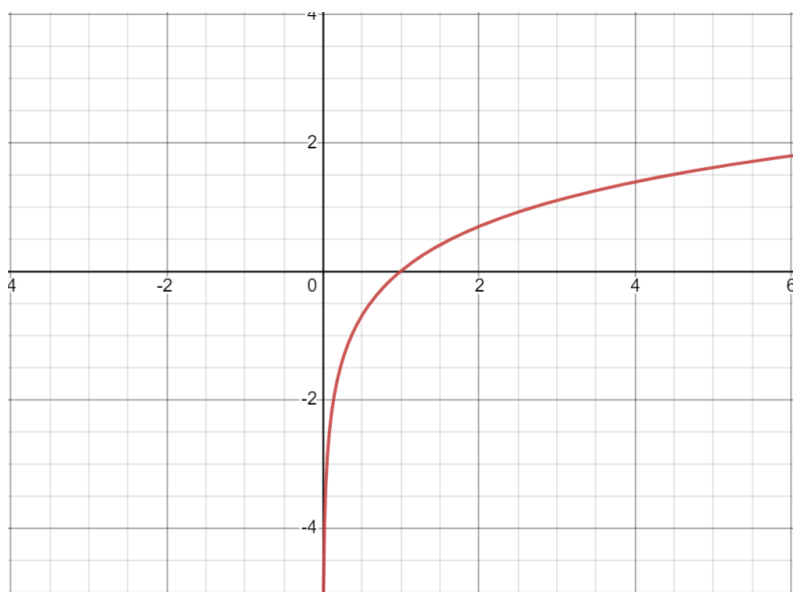2)   Parent Function: $y = \sin x$ (set mode to RADIANS)

a) $y = \sin(2x)$
b) $y = \sin x - 2$
c) $y = 2\sin x$
d) $y = 2\sin(2x) + 2$

3) Parent Function: $y = \ln(x)$

a)	$y = \ln(x+3)$
b)	$y = -\ln(x)$
c)	$y = \ln(-x)$
d)	$y = \ln(|x|)$

4) Parent Function: $y = e^x$

a)	$y = 2e^x$
b)	$y = e^x + 3$
c)	$y = e^{-x}$
d)	$y = 2 - e^x$
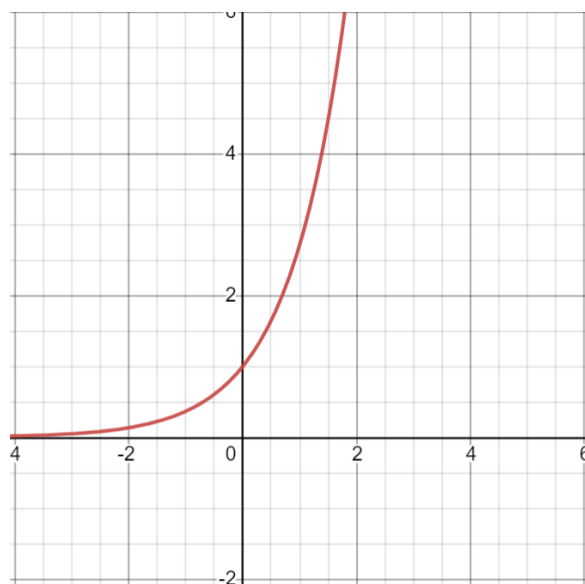
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5) Using your calculator (or Desmos) set the x "window" to [0,1] and the y "window" to [0,1]. <u>Graph all of the following functions in the same window.</u> List the functions from the highest graph to the lowest graph.

a) $y = x^2$ b) $y = x^3$

c) $y = \sqrt{x}$ d) $y = x^{2/3}$

e) $y = |x|$ f) $y = x^4$

Highest ▼	Letter
Lowest	

6) Using your calculator (or desmos) set the x "window" to values greater than 1 [to [0,5] and the y "window" to [0,5]. <u>Graph all of the following functions in the same window.</u> List the functions from the highest graph to the lowest graph when $x > 1$.

a) $y = x^2$ b) $y = x^3$

c) $y = \sqrt{x}$ d) $y = x^{2/3}$

e) $y = |x|$ f) $y = x^4$

Highest ▼	Letter
Lowest	

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More Calculator practice

7)   Given: $f(x) = x^4 - 3x^3 + 2x^2 - 7x - 11$
      Find all roots to the nearest 0.001

8)   Given: $f(x) = 3\sin(2x) - 4x + 1$ on $[-2\pi, 2\pi]$
      Find all roots to the nearest 0.001.
      Note: All trig functions are radian mode.

Solve the following inequalities.

9) $x^2 - x - 6 > 0$ (this can be a calculator or by hand)

10) $x^2 - 2x - 5 \geq 3$

11) $x^3 - 4x < 0$

12) Where does $f(x) = 3x + 2$ intersect $g(x) = -4x - 2$?

13)   Given: $f(x) = x^2 - 5x + 2$ and $g(x) = 3 - 2x$
      Find the coordinates of any points of intersection.

14) Solve by hand on the interval [0, 2π]. Leave your answer in terms of π. Check with
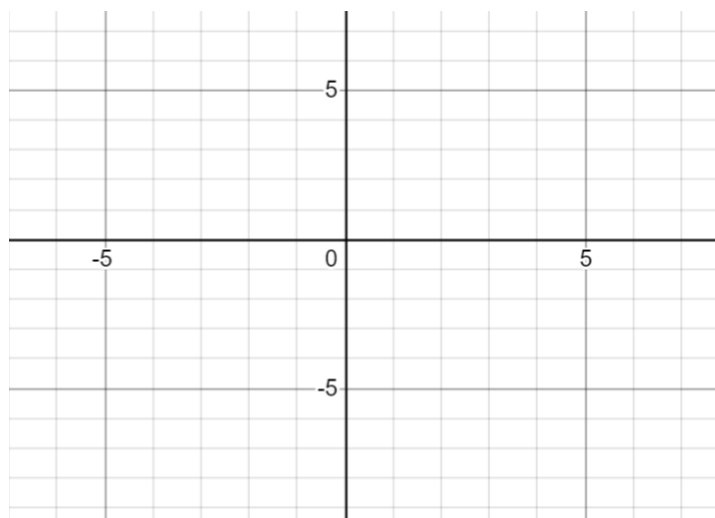   your calculator. $2\cos x + \sin 2x = 0$

15) If $f(x) = x^4 - 7x^3 + 6x^2 + 8x + 9$

      a)   Find the coordinates of the lowest point on the graph.
      b)   Find the coordinates of the highest point on the graph.\
      c)   Find the interval(s) over which f(x) is increasing

16)   Given $f(x) = x^2 - 5x + 4$
a) Sketch the graph of f(x) on
   the grid to the right.
b) By hand, sketch the graph of |f(x)|
c) By hand sketch the graph of f(x) - 2

17) Find the equation for the given polynomial
that goes through the points (-4, 0), (0, 0),
(1, 0), (2, 12) and 3, 0) and touches the
point (-2, 0). See the graph to the right.
Show your work, check your solution
with your calculator

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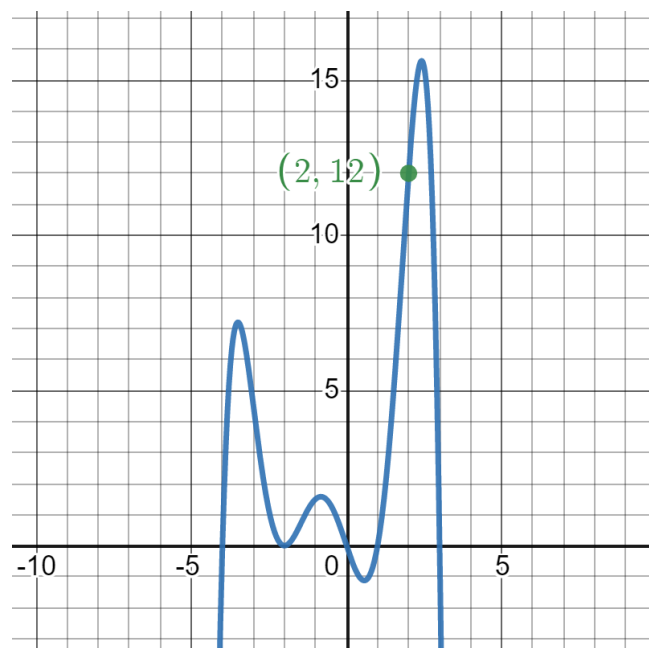
18) **Functions** → The ability to work with any type of function is crucial to success in calculus. This section will have you work with functions graphically and analytically, as well as test your knowledge of function notation.

A. Determine each of the following using the graph of $g(x)$. Each answer should be in terms of a, b, c, p, q or r.
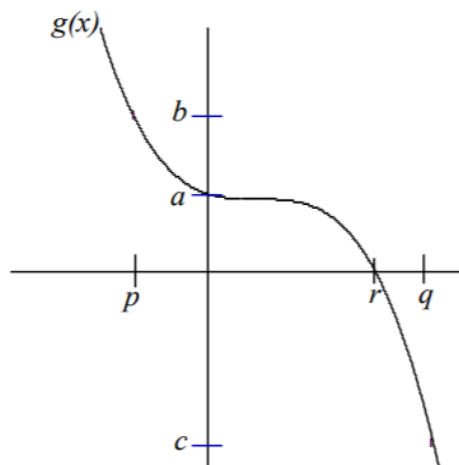
    i. $g(q) =$ _____   iii. $g(g(r)) =$ _____

    ii. $-g(p) =$ _____   vi. $g^{-1}(b) =$ _____

B. Fill in each blank with $<, >$ or $=$.

    i. $g(p)$ ___ $g(0)$ iii. $g(p) - g(q)$ ___ 0

    ii. $g^{-1}(c)$ ___ $g^{-1}(0)$ vi. $g(0) \cdot g(q)$ ___ 0

C. Given function $f(x)$ such that $f(-2) = 5$, complete each of the following statements.

    i. One (x, y) coordinate of a point that must be on the graph of $f^{-1}(x)$ is _____.

    ii. If $f(x)$ is an odd function, then the (x, y) coordinates of 2 points that must be on the graph of $f(x)$ are _____ and _____.

    iii. If $f(x)$ is an even function, then the (x, y) coordinates of 2 points that must be on the graph of $f(x)$ are _____ and _____.

D. Given the function $h(x) = \begin{cases} -2x - 4, & x < -2 \\ -(x-1)^2 - 3, & x \geq 0 \end{cases}$, determine each of the following.

    i. $h(-2) =$ _____   ii. $h(0) =$ _____   iii. $h(5) - h(-3) =$ _____

    iv.   Determine the domain of $h(x)$.

    v.   Determine the range of $h(x)$.

    vi.   If they were defined for all the real numbers, at what point(s) do the two pieces of the function $h(x)$ intersect. i.e. Without using the graphing capabilities of your calculator, solve the following system of equations $\begin{cases} y = -2x - 4 \\ y = -(x-1)^2 - 3 \end{cases}$