Name: _____ Date: _____ Period: _____

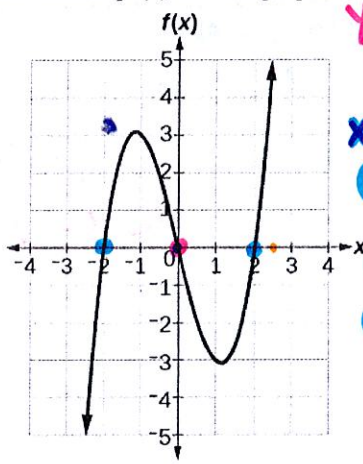
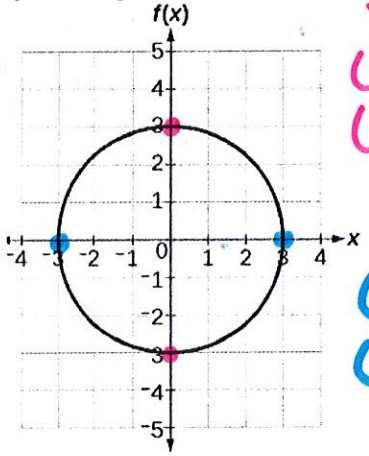
2.1 Intercepts, Maximums and Minimums

A: Intercepts

Algebraically

To find x-intercept, set y or f(x) equal to zero and then solve for x. (x, 0)	To find y-intercept, set x equal to zero and evaluate/solve for y. (0, y)
Ex: Find the x-intercept of the function $4x + 3y = 27$	Ex: Find the y-intercept of the function $f(x) = 3 + 2^x$
$4x+3(0)=27$ $\frac{4x}{4} = \frac{27}{4}$ $x = \frac{27}{4}$ point $(\frac{27}{4}, 0)$	$y = 3+2^x$ $y = 3+2^0$ $y = 3+1$ $y = 4$ point $(0, 4)$

Graphically

x-intercept: where the graph touches/crosses the x-axis	y-intercept: where the graph touches/crosses the y-axis
Ex: Find the x-intercept(s) on the graph.	Ex: Find the y-intercept on the graph.
 y-int: (0,0) x-int(s): (-2,0) (2,0) (0,0)	 y-int: (0,3) (0,-3) x-int(s): (-3,0) (3,0)

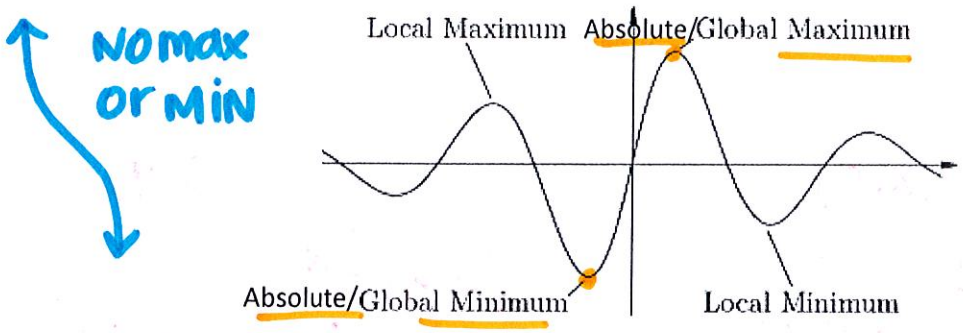
If an intercept falls between 2 values on the number line, estimate that intercept using a decimal value.

Find all of the intercepts for the functions below: Round decimals to nearest tenth. (1 decimal place)

1. $f(x) = 2 - x$ x-int: (2,0) y-int (0,2)
2. $f(x) = \frac{x-2}{3}$ x-int: (2,0) y-int $(0, -\frac{2}{3})$
3. $f(x) = x^2 + 1$
4. $f(x) = 4 - x^2$
5. $f(x) = 2$
6. $f(x) = x^3$
7. $f(x) = x(x-1)(x+2)$
8. $f(x) = \sqrt{x-2}$
9. $f(x) = \sqrt{5-x}$
10. $f(x) = 3 - 2\sqrt{x+2}$
11. $f(x) = \sqrt[3]{x}$
12. $f(x) = \frac{1}{x^2+1}$

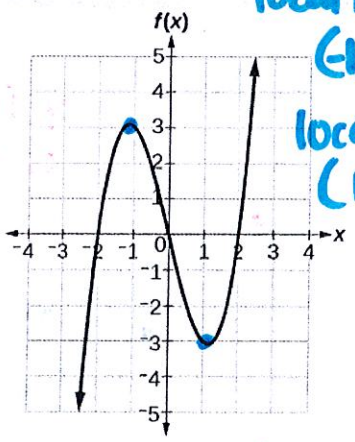
B: Maximums and Minimums

Remember maximums are hills and minimums are valleys.



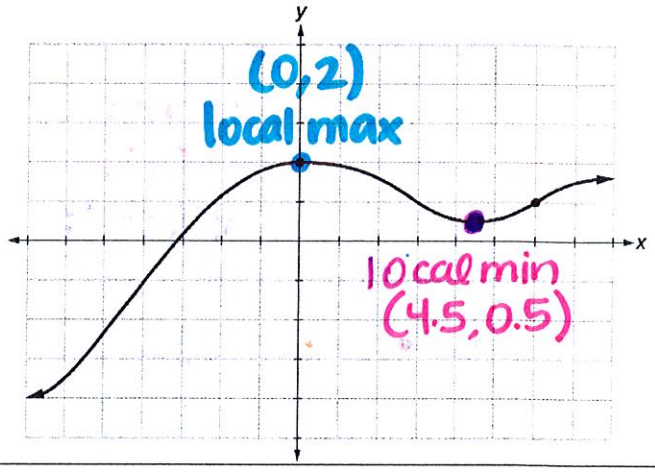
You will not learn an algebraic way to find maximums and minimums, you must use the graph or graphing calculator to find the maximums and minimums of the graph.

Ex: Identify the maximums and minimums on the graph below.



local max (-1, 3)
local min (1, -3)

Ex: Identify the maximums and minimums on the graph below.



(0, 2) local max
local min (4.5, 0.5)

Use the calculator to find the maximums and minimums of the functions below. If the function has no maximum or no minimum, please note that.

1. $y = x^3 - 5x^2 + 7x - 5$ MAX (1, -2) MIN (2.3, -3.2)

2. $y = x^3 - 6x^2 + 9x + 1$

3. $y = -x^3 - 3x^2 - 1$

4. $y = 3x^2 - 6x + 5$

5. $y = 5 - |x - 4|$

6. $y = (2x - 8)^{\frac{2}{3}}$

7. $y = -x^2 + 6$

8. $y = \sqrt{x - 3} + 2$

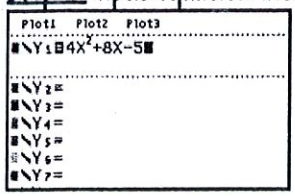
2.1 Calculator Instructions For Finding Intercepts(Zeros), Maximums and Minimums

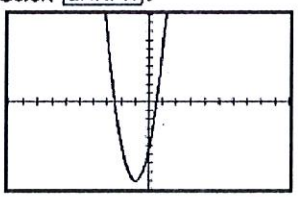
To Find X-intercepts/Zeros

Method 1:

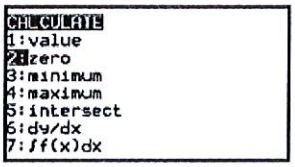
Step 1: Click on [ON]. Click on [Y=].

Step 2: Input equation into Y_1=. Click [GRAPH].

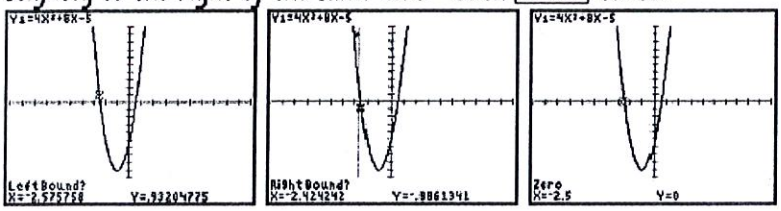




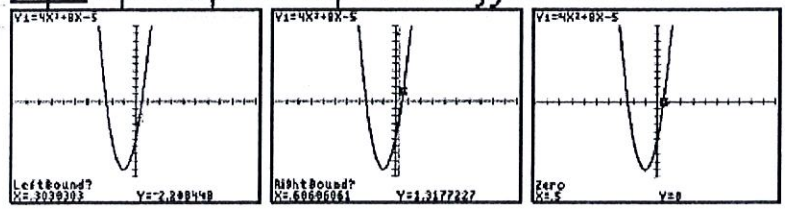
Step 3: Click on [2nd] → [TRACE]. Choose 2: zero.



Step 4: Move the blinking dot slightly to the left of one of the zeros by using the ◄ or ►. Click [ENTER]. Move the dashed line slightly to the right of the same zero. Click [ENTER] twice.



Step 5: Repeat Step 3 and Step 4 to identify the other zero.



Method 2:

Click on Y =

Input equation into Y_1 =

Set $Y_2 = 0$

Click GRAPH

Click 2nd, TRACE

Choose 5: intersect

Move blinking dot close to the x-intercept you want to find by using left and right arrows. Click ENTER three times.

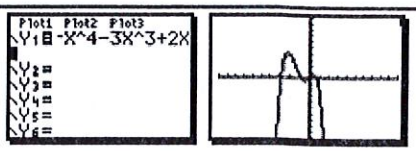
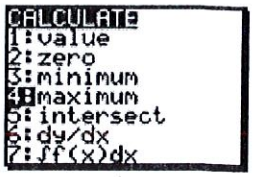
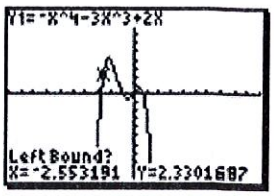
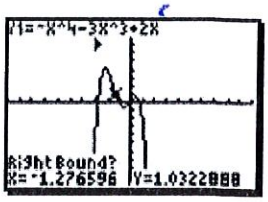
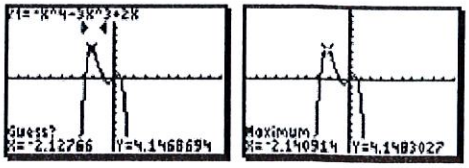
Your intersection point is the x-intercept.

To Find y-intercept

Method 1:
Click on Y =
Input equation into Y_1 =
Click 2nd, TRACE
Choose 1: value
Press "0"

Method 2:
Click on Y =
Input equation into Y_1 =
Click 2nd, GRAPH
Look at the output for x = 0

To Find Maximums and Minimums

PROBLEM	*BUTTONS*	*CALCULATOR*
Locate the **maximum** of the Function: $y = -x^4 - 3x^3 + 2x$	*1. First graph the function* Y = , (-) , X,T,θ,n , ^ , 4 , − , 3 , X,T,θ,n , ^ , 3 , + , 2 , X,T,θ,n , ZOOM , 6 *2. Press,* 2nd , TRACE , 4 *3. Using the LEFT arrow key ,* ◄ *, move the cursor to the left of the maximum point and press* ENTER . *4. Using the Right arrow key ,* ► *, move the cursor to the right of the maximum point and press* ENTER . *5. Finally, using the arrow keys ,* ◄ , ► *, move the cursor to the approximate location of the maximum point and press* ENTER . (−2.14 , 4.15)	    
Locate the **minimum** of the Function: $y = x^2 - 5x$	*Using a very similar technique try locating the minimum. Just use the* ***MINIMUM*** *command under the CALCULATE window.*