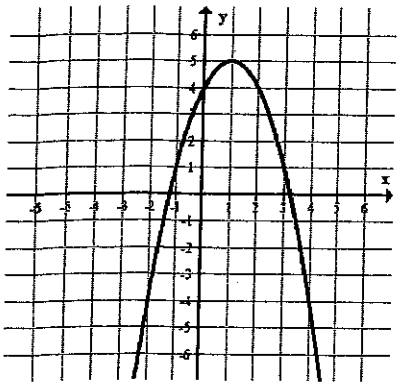
NC Math 2 **Name:** Key

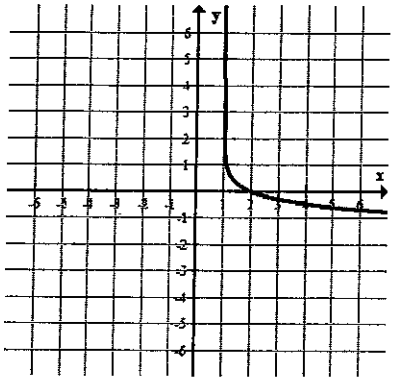
Increasing and Decreasing Intervals **Date:** _____

Determine which function corresponds to each description below. Place the letter of the graph next to the correct description(s).

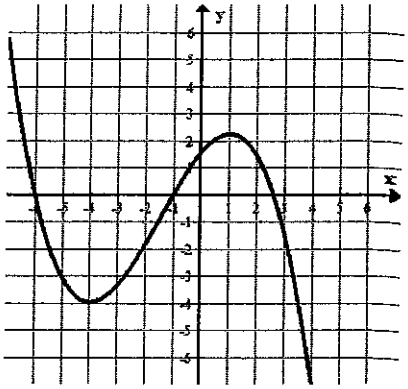
A.



B.



C.



1. Increasing over the interval $(-\infty, 1)$. A

2. Decreasing over the interval $(-\infty, -4)$. C

3. Increasing over the interval $(-4, 1)$. C

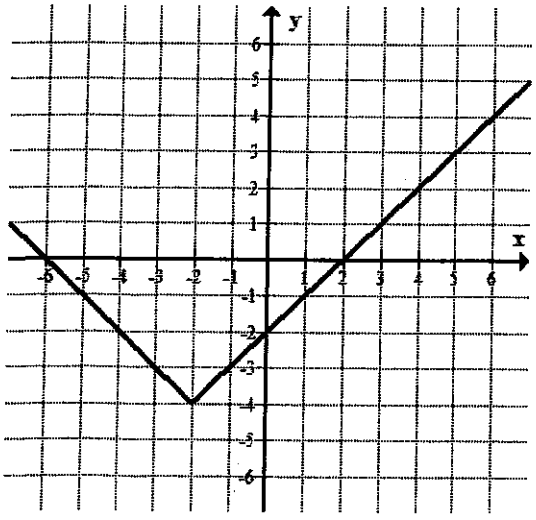
4. Decreasing over the interval $(-\infty, \infty)$. B

* Dont worry about brackets when line is continuous

For each graph below, give the interval(s) over which the function is increasing and/or decreasing.

5. Increasing: $(-2, \infty)$

Decreasing: $-8, -2$



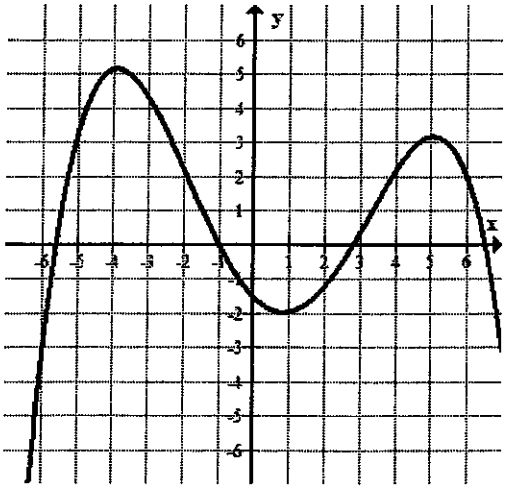
Describe End Behavior:

As $x \to \infty$, $y \to \infty$

$x \to -\infty$, $y \to \infty$

6. Increasing: $(-\infty, -4), (1, 5)$

Decreasing: $(-4, 1), (5, \infty)$



End Behavior:

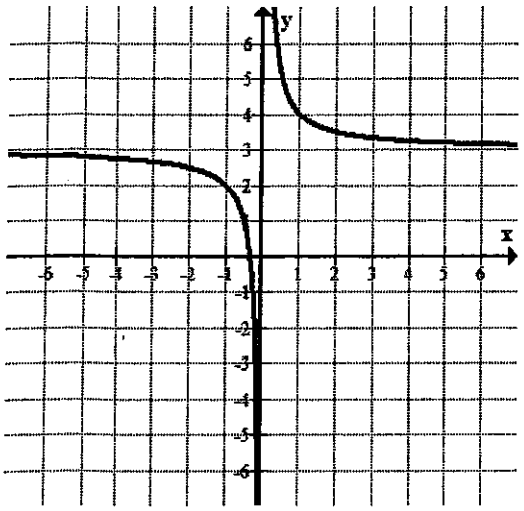
As $x \to \infty$, $y \to -\infty$

$x \to -\infty$, $y \to -\infty$

End Behavior: As $x \to \infty$, $y \to -\infty$; $x \to -\infty$, $y \to +\infty$

7. Increasing: never

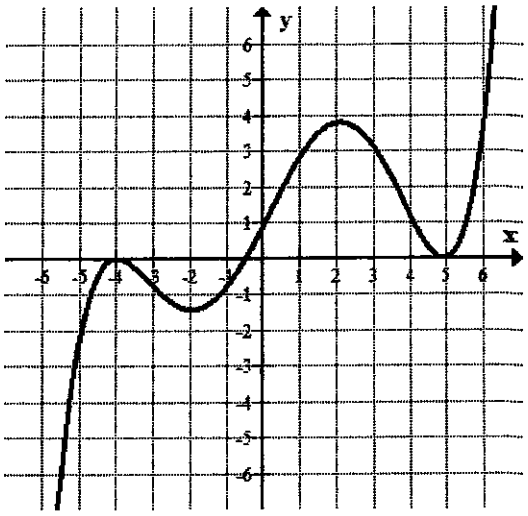
Decreasing: $(-\infty, 0)$ & $(0, \infty)$ or $(-\infty, \infty)$



End Behavior: As $x \to \infty$, $y \to \infty$; $x \to -\infty$, $y \to \infty$

8. Increasing: $(-\infty, -4)$, $(-2, 2)$, $(5, \infty)$

Decreasing: $(-4, -2)$, $(2, 5)$

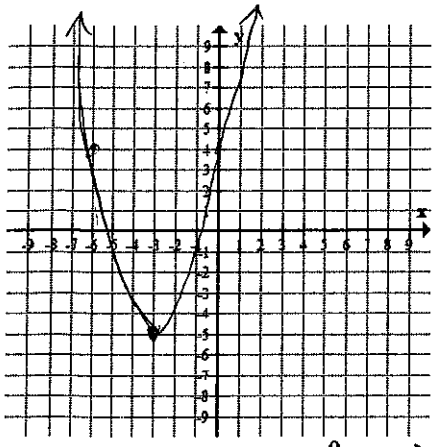


Sketch the graph of each function; then determine the interval(s) over which the function increases and/or decreases.

9. $y = x^2 + 6x + 4$

Increasing: $(-3, \infty)$

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

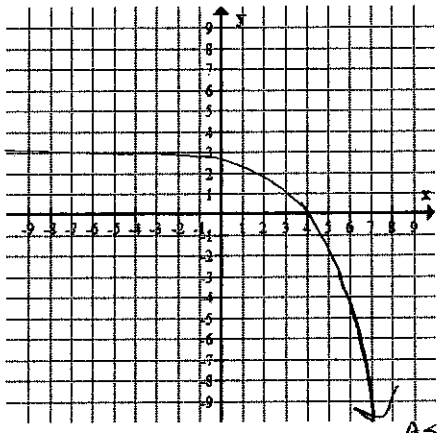


End Behavior: As $x \to \infty$, $y \to \infty$; $x \to -\infty$, $y \to \infty$

10. $y = -2^{(x-2)} + 3$

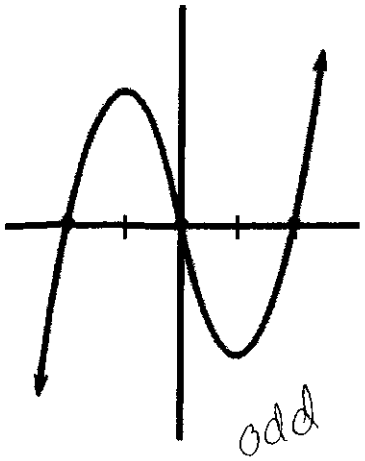
Increasing: never

Decreasing: $(-\infty, \infty)$

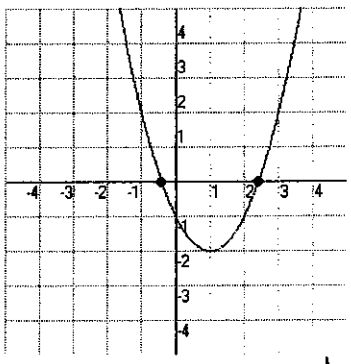


End Behavior: As $x \to \infty$, $y \to -\infty$; $x \to -\infty$, $y \to \infty$

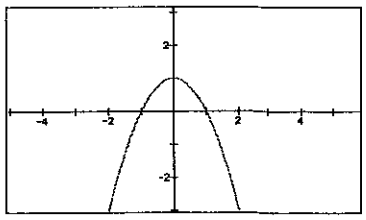
Label the following graphs as even, odd, or neither?



odd



neither

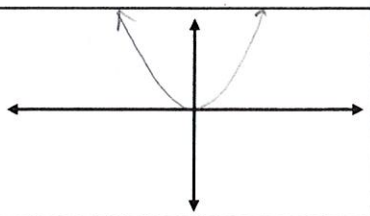
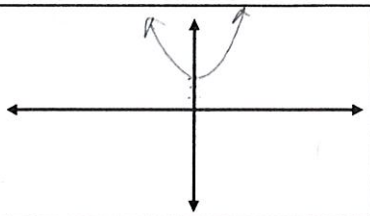
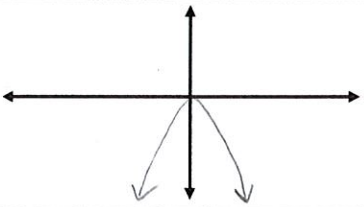
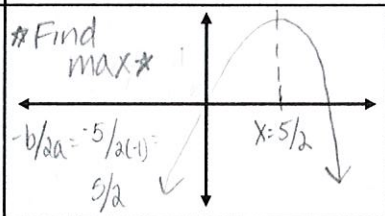
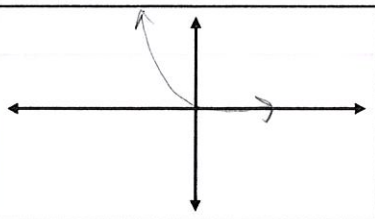
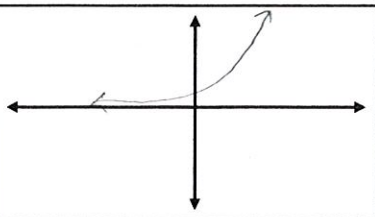


even

Key

Domain and Range

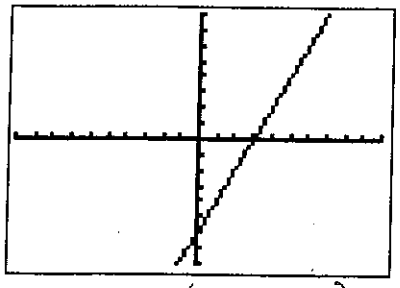
For each function below, graph the function, state the domain and range, name the intervals where the function is increasing or decreasing, and describe the end behavior.

Function	Graph	Domain and Range	Intervals Where Increasing or Decreasing	End Behavior
1. $f(x) = \frac{1}{2}x^2$		Domain: $(-\infty, \infty)$ Range: $[0, \infty)$	Inc: $(0, \infty)$ Dec: $(-\infty, 0)$	As $x \to \infty$, $y \to \infty$ As $x \to -\infty$, $y \to \infty$
2. $y = x^2 + 3$		Domain: $(-\infty, \infty)$ Range: $[3, \infty)$		As $x \to \infty$, $y \to \infty$ $x \to -\infty$, $y \to \infty$
3. $y = -3x^2$		Domain: $(-\infty, \infty)$ Range: $(-\infty, 0]$	Inc: $(-\infty, 0)$ Dec: $(0, \infty)$	As $x \to \infty$, $y \to -\infty$ $x \to -\infty$, $y \to -\infty$
4. $y = x(5 - x)$ $-x^2 + 5x$		Domain: $(-\infty, \infty)$ Range: $(-\infty, 6.25]$ ↑ would see if just in table	Inc: $(-\infty, 5/2)$ Dec: $(5/2, \infty)$	As $x \to \infty$, $y \to -\infty$ $x \to -\infty$, $y \to -\infty$
5. $m(x) = \left(\frac{1}{3}\right)^x$		Domain: $(-\infty, \infty)$ Range: $(0, \infty)$ never touches x↓ exp.	Inc: — Dec: $(-\infty, \infty)$	As $x \to \infty$, $y \to -\infty$ $x \to -\infty$, $y \to \infty$
6. $h(x) = 3^x$		Domain: $(-\infty, \infty)$ Range: $(0, \infty)$	Inc: $(-\infty, \infty)$ Dec: —	As $x \to \infty$, $y \to \infty$ $x \to -\infty$, $y \to -\infty$

Answer

Where to Begin and End

For each function below, state the domain and range, name the intervals where the function is increasing or decreasing, and describe the end behavior.

1. 

Neither

Domain $(-\infty, \infty)$

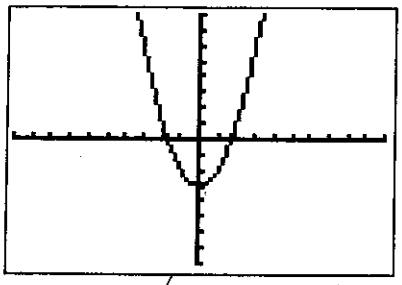
Range $(-\infty, \infty)$

Increasing $(-\infty, \infty)$

Decreasing —

End behavior As $x \to \infty$, $y \to \infty$

As $x \to -\infty$, $y \to -\infty$

2. 

Even

Domain $(-\infty, \infty)$

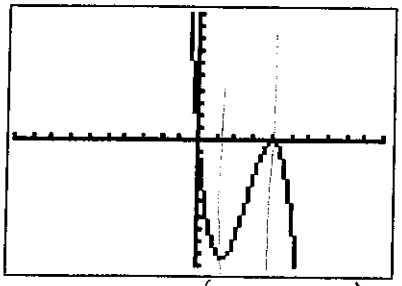
Range $[-3, \infty)$

Increasing $(0, \infty)$

Decreasing $(-\infty, 0)$

End behavior As $x \to \infty$, $y \to \infty$

As $x \to -\infty$, $y \to \infty$

3. 

Neither

Domain $(-\infty, \infty)$

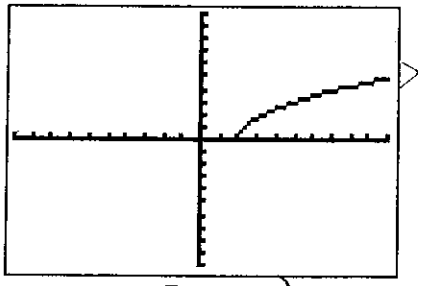
Range $(-\infty, \infty)$

Increasing $(1, 4)$

Decreasing $(-\infty, 1)\ (4, \infty)$

End behavior As $x \to \infty$, $y \to -\infty$

As $x \to -\infty$, $y \to \infty$

4. 

Left → Right

Neither

Domain $[2, \infty)$

Range $[0, \infty)$

Increasing $(2, \infty)$

Decreasing —

End behavior As $x \to \infty$, $y \to \infty$

As $x \to 2$, $y \to 0$

5. $f(x) = 3x + 5$

Linear w/ positive slope

Domain $(-\infty, \infty)$

Range $(-\infty, \infty)$

Increasing $(-\infty, \infty)$

Decreasing —

Neither

End behavior As $x \to \infty$, $y \to \infty$

$x \to -\infty$, $y \to -\infty$

6. $f(x) = -3x + 5$

Linear w/ negative slope

Domain $(-\infty, \infty)$

Range $(-\infty, \infty)$

Increasing —

Decreasing $(-\infty, \infty)$

Neither

End behavior $x \to \infty$, $y \to -\infty$

$x \to -\infty$, $y \to \infty$

7. $f(x) = x^2$ Parent function

Domain $(-\infty, \infty)$

Range $[0, \infty)$

Increasing $(0, \infty)$

Decreasing $(-\infty, 0)$

Even

End behavior $x \to \infty$, $y \to \infty$

$x \to -\infty$, $y \to \infty$

8. $f(x) = (x + 3)^2$ left 3

Domain $(-\infty, \infty)$

Range $[0, \infty)$

Increasing $(-3, \infty)$

Decreasing $(-\infty, -3)$

Neither

End behavior $x \to \infty$, $y \to \infty$

$x \to -\infty$, $y \to \infty$

9. $f(x) = -2x^2 - 2$

Domain $(-\infty, \infty)$

Range $(-\infty, -2]$

Increasing $(-\infty, 0)$

Decreasing $(0, \infty)$

Even

End behavior $x \to \infty$, $y \to -\infty$

$x \to -\infty$, $y \to -\infty$

10. $f(x) = x^3 + 6x^2 + 9x$

Domain $(-\infty, \infty)$

Range $(-\infty, \infty)$

Increasing $(-\infty, -3) \cup (-1, \infty)$

Decreasing $(-3, -1)$

Neither

End behavior As $x \to \infty$, $y \to \infty$

$x \to -\infty$, $y \to -\infty$