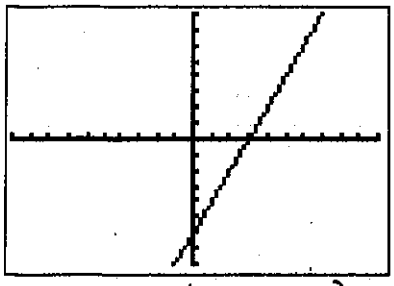
Answer

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. 

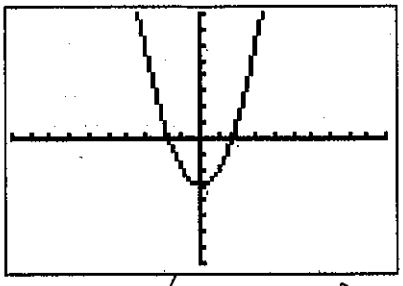
Domain $(-\infty, \infty)$

Range $(-\infty, \infty)$

Increasing $(-\infty, \infty)$

Decreasing —

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

2. 

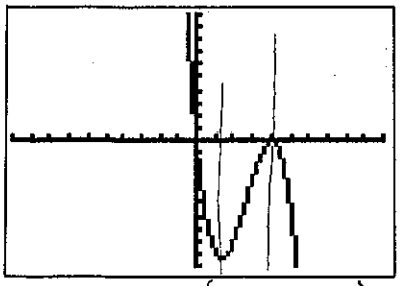
Domain $(-\infty, \infty)$

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. 

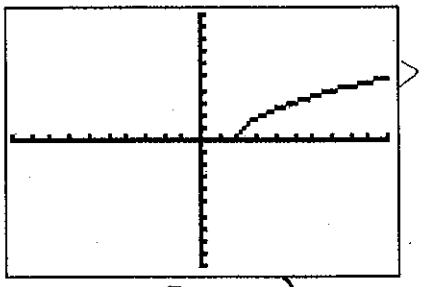
Domain $(-\infty, \infty)$

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

Domain $[2, \infty)$

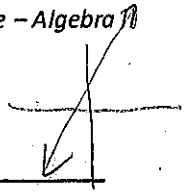
Range $[0, \infty)$

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 —

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 $(-\infty, \infty)$

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 $[0, \infty)$

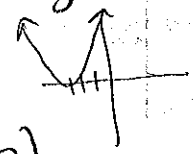
Increasing $(0, \infty)$

Decreasing $(-\infty, 0)$

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 $[0, \infty)$

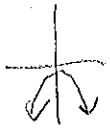
Increasing $(-3, \infty)$

Decreasing $(-\infty, -3)$

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

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

9. $f(x) = -2x^2 - 2$ (reflect over x, stretch, down 2 → starting pt)



Domain $(-\infty, \infty)$

Range $(-\infty, -2]$

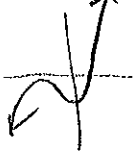
Increasing $(-\infty, 0)$

Decreasing $(0, \infty)$

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 $(-3, -1)$

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

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