

1. Consider the function $m(x)$ can be defined by the set of ordered pairs $\{(2,3), (-3,5), (1,4), (5,3), (3,-1), (0,1), (-2,5)\}$
What is the Domain: **INPUT OR X-VALUES**

$\{-3, -2, 0, 1, 2, 3, 5\}$

What is the Range: **OUTPUT OR Y-VALUES**

$\{-1, 1, 3, 4, 5\}$

2. Given $f(x) = x^2 + 3$. Determine the Range of $f(x)$ if the Domain is restricted to just $\{-2, 0, 1, 2, 5\}$

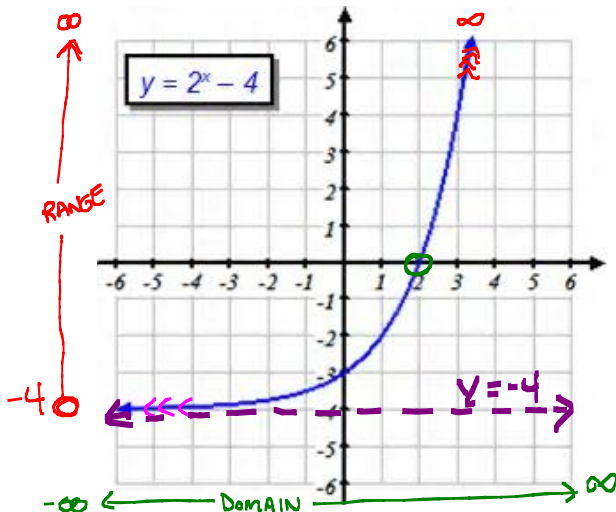
$$\begin{aligned} f(-2) &= (-2)^2 + 3 = 4 + 3 = 7 \\ f(0) &= (0)^2 + 3 = 0 + 3 = 3 \\ f(1) &= (1)^2 + 3 = 1 + 3 = 4 \\ f(2) &= (2)^2 + 3 = 4 + 3 = 7 \\ f(5) &= (5)^2 + 3 = 25 + 3 = 28 \end{aligned}$$

RANGE

$\{3, 4, 7, 28\}$

4. Describe the Domain, Range, Intervals of Increase/Decrease, End Behavior, Intercepts.

A. Consider the following function.



i) Describe the **Domain**: $(-\infty, \infty)$ or $\{R\}$

ii) Describe the **Range**: $(-4, \infty)$ or $y > -4$

iii) Describe **Intervals of Increase**: $(-\infty, \infty)$

iv) Describe **Intervals of Decrease**: **DOES NOT EXIST**

v) As $x \rightarrow \infty$, determine $f(x) \rightarrow \infty$
RIGHT

vi) As $x \rightarrow -\infty$, determine $f(x) \rightarrow -4$
LEFT

vii) Determine the **x-intercept**: $(2, 0)$

viii) Determine the **y-intercept**: $(0, -3)$

ix) **Horizontal Asymptote**: $y = -4$

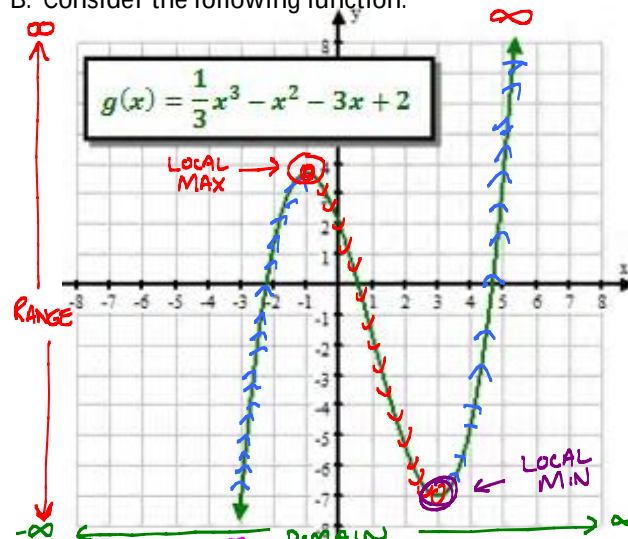
3. Given $h(x) = 2x - 1$. Determine the Domain of $h(x)$ if the Range is just the set $\{-3, 1, 5, 7, 11\}$

$$\begin{aligned} -3 &= 2x - 1 \Rightarrow -2 = 2x \Rightarrow x = -1 \\ 1 &= 2x - 1 \Rightarrow 2 = 2x \Rightarrow x = 1 \\ 5 &= 2x - 1 \Rightarrow 6 = 2x \Rightarrow x = 3 \\ 7 &= 2x - 1 \Rightarrow 8 = 2x \Rightarrow x = 4 \\ 11 &= 2x - 1 \Rightarrow 12 = 2x \Rightarrow x = 6 \end{aligned}$$

DOMAIN:

$\{-1, 1, 3, 4, 6\}$

B. Consider the following function.



i) Describe the **Domain**: $(-\infty, \infty)$ or $\{R\}$

ii) Describe the **Range**: $(-\infty, \infty)$ or $\{R\}$

iii) Describe **Intervals of Increase**: $(-\infty, -1) \cup (3, \infty)$

iv) Describe **Intervals of Decrease**: $(-1, 3)$

v) As $x \rightarrow \infty$, determine $f(x) \rightarrow \infty$

vi) As $x \rightarrow -\infty$, determine $f(x) \rightarrow -\infty$

vii) List any **local maximums**: $(-1, 3.67)$

viii) List any **local minimums**: $(3, -7)$

ix) **Average Rate of Change** on the interval from $x = -3$ to $x = 0$
 $M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - (-7)}{0 - (-3)} = \frac{9}{3} = 3$

$(-3, -7)$ AND $(0, 2)$
 $x_1 \ y_1 \quad x_2 \ y_2$

5. A plumber charges \$60 per hour and will only work a maximum of 8 hours on any given day. If we consider this situation a function where the number of hours worked, x , is the independent variable and how much the plumber charges in dollars, y , is the dependent variable.

Determine the Domain and Range of the function. **ON ANY GIVEN DAY**

What is the **Domain**:

SET NOTATION: $0 \leq x \leq 8$ HOURS

INTERVAL NOTATION: $[0, 8]$ HOURS

What is the **Range**:

$0(60) = 0$ $8(60) = 480$

SET: $0 \leq y \leq 480$

INT: $[0, 480]$

TO THE NEAREST CENT SINCE PAYMENT VALUES ARE NOT CONTINUOUS.



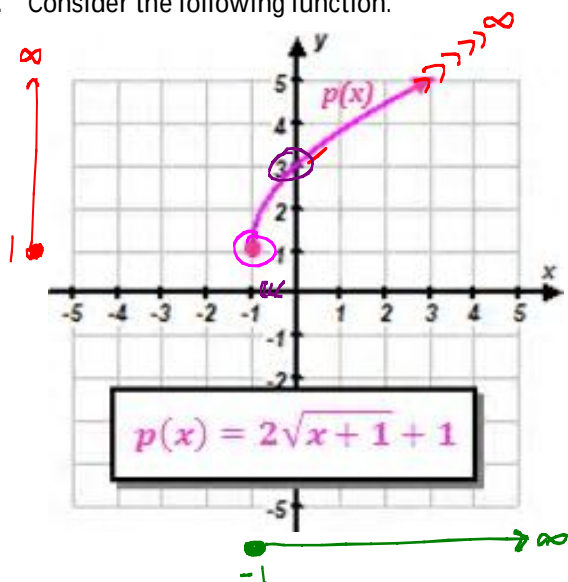
6. A population of frogs in a pond area doubles every year. Initially there were 8 frogs. A researcher studying the frogs created a function to model their population growth. $P(t) = 8(2^t)$, where t is the time in years. If we consider this situation to be a function then determine an appropriate Domain and Range.



What is the **Domain**: SET: $t \geq 0$
 (TIME IN YEARS) INT: $[0, \infty)$

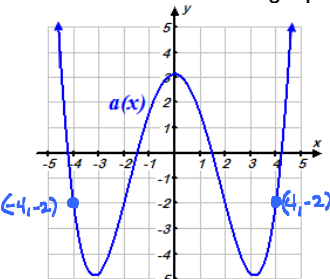
What is the **Range**: SET: $P(t) \geq 8$ INTEGERS ONLY
 (NUMBER OF FROGS) INT: $[8, \infty)$ INTEGERS ONLY
 ROSTER: $\{8, 9, 10, 11, 12, \dots\}$

7. Consider the following function.

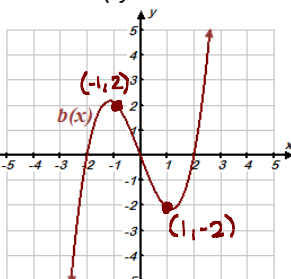


- Describe the **Domain**: $[-1, \infty)$ $x \geq -1$
- Describe the **Range**: $[1, \infty)$ $P(x) \geq 1$
- As $x \rightarrow -1$, determine $f(x) \rightarrow 1$
- As $x \rightarrow \infty$, determine $f(x) \rightarrow \infty$
 RIGHT
- Determine the **y-intercept**: $(0, 3)$
- List any **local maximums**: DOES NOT EXIST
- List any **local minimums**: 1
- Average Rate of Change** on: $M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 3}{3 - 0} = \frac{2}{3}$
 the interval $(0, 3)$
 POINTS
 $(0, 3)$ AND $(3, 5)$
 $x_1 \ y_1 \quad x_2 \ y_2$

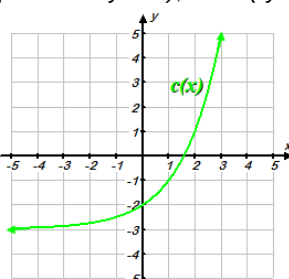
8. Describe each graph as **EVEN** (symmetric with respect to the y-axis), **ODD** (symmetric with respect to the origin), or **NEITHER**.



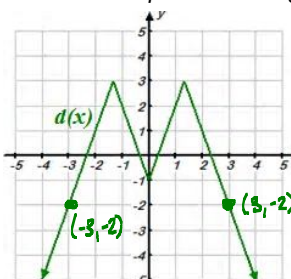
EVEN



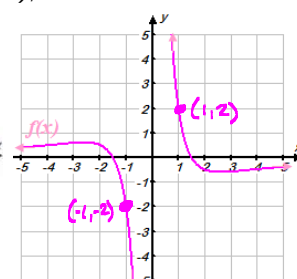
ODD



NEITHER



EVEN



ODD

9. Describe each function as **EVEN** (symmetric with respect to the y-axis), **ODD** (symmetric with respect to the origin), or **NEITHER**.

ALL EVEN POWERS OF "x"

ALL ODD POWERS OF "x".

a. $f(x) = x^4 + 5x^2$: **EVEN**

b. $g(x) = x^3 - 2x$: **ODD**

$f(-x) = f(x)$
 $(-x)^4 + 5(-x)^2 = x^4 + 5x^2$
 $x^4 + 5x^2 = x^4 + 5x^2$ ✓

$g(-x) = -g(x)$
 $(-x)^3 - 2(-x) = -(x^3 - 2x)$
 $-x^3 + 2x = -x^3 + 2x$ ✓

c. $h(x) = x^5 - 4x^0$: **NEITHER**

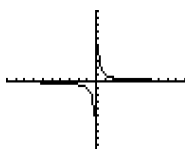
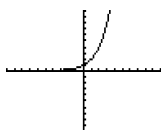
d. $m(x) = x^4 + 3x^2 + 2x^0$: **EVEN**

ODD POWERS MIXED

$m(-x) = m(x)$
 $(-x)^4 + 3(-x)^2 + 2 = x^4 + 3x^2 + 2$
 $x^4 + 3x^2 + 2 = x^4 + 3x^2 + 2$ ✓

e. $p(x) = 2^x$: **NEITHER**

f. $q(x) = \frac{1}{x}$: **ODD**



$q(-x) = -q(x)$
 $\frac{1}{(-x)} = -\frac{1}{x}$
 $\frac{1}{-x} = -\frac{1}{x}$ ✓

An **even** function can be defined as any function such that:
 $f(-x) = f(x)$

An **odd** function can be defined as any function such that:
 $f(-x) = -f(x)$