

**Sec 6.8 – Mathematical Modeling
Characteristics of Functions**

Name: _____

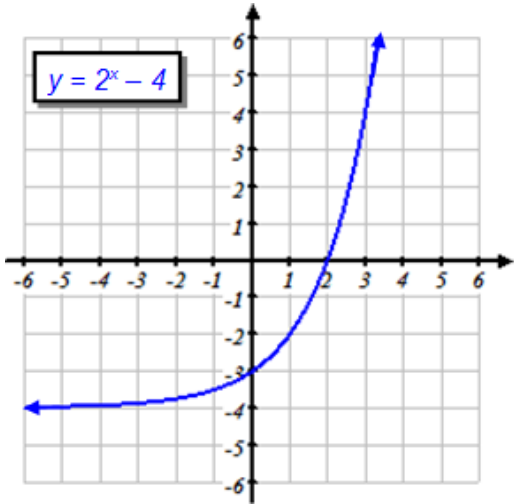
1. Consider the function $m(x)$ can be defined by the set of ordered pairs $\{(2,3), (-3,5), (1,4), (5,3), (3, -1), (0,1), (-2,5)\}$
 What is the Domain: _____ What is the Range: _____

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

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

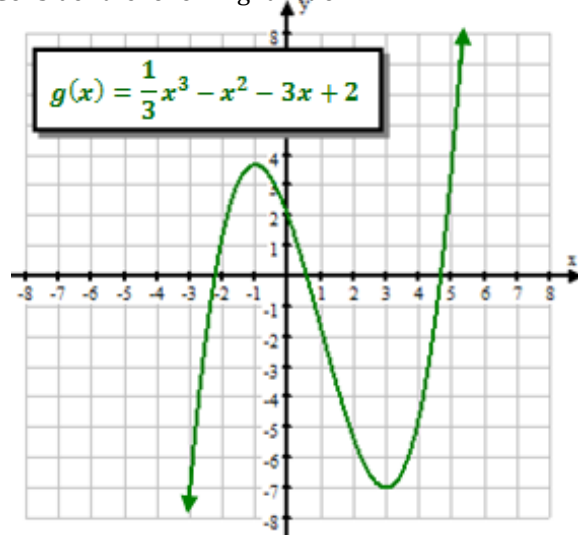
4. Describe the Domain, Range, Intervals of Increase/Decrease, End Behavior, Intercepts.

A. Consider the following function.



- i) Describe the **Domain**: _____
- ii) Describe the **Range**: _____
- iii) Describe **Intervals of Increase**: _____
- iv) Describe **Intervals of Decrease**: _____
- v) As $x \rightarrow \infty$, determine $f(x) \rightarrow$ _____
- vi) As $x \rightarrow -\infty$, determine $f(x) \rightarrow$ _____
- vii) Determine the **x-intercept**: _____
- viii) Determine the **y-intercept**: _____
- ix) **Horizontal Asymptote**: _____

B. Consider the following function.



- i) Describe the **Domain**: _____
- ii) Describe the **Range**: _____
- iii) Describe **Intervals of Increase**: _____
- iv) Describe **Intervals of Decrease**: _____
- v) As $x \rightarrow \infty$, determine $f(x) \rightarrow$ _____
- vi) As $x \rightarrow -\infty$, determine $f(x) \rightarrow$ _____
- vii) List any **local maximums**: _____
- viii) List any **local minimums**: _____
- ix) **Average Rate of Change** on the _____ interval from $x = -3$ to $x = 0$

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.

What is the **Domain**: _____

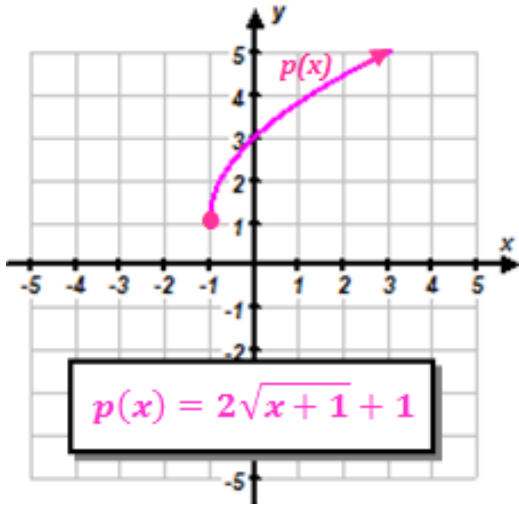
What is the **Range**: _____



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**: _____ What is the **Range**: _____

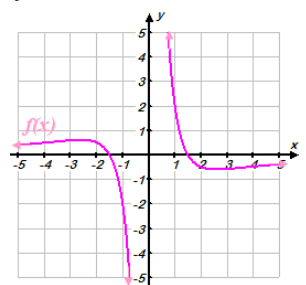
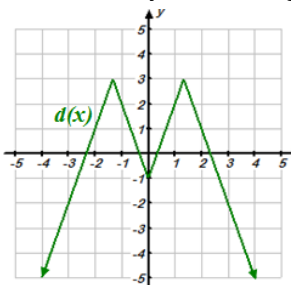
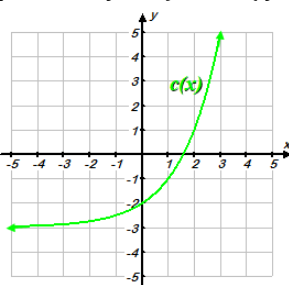
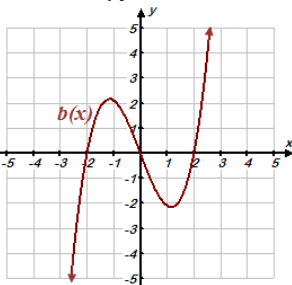
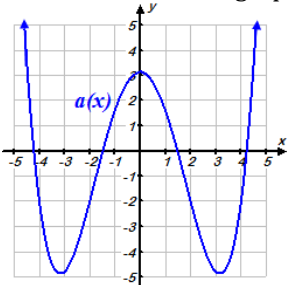


7. Consider the following function.



- i) Describe the **Domain**: _____
- ii) Describe the **Range**: _____
- iii) As $x \rightarrow -1$, determine $p(x) \rightarrow$ _____
- iv) As $x \rightarrow \infty$, determine $p(x) \rightarrow$ _____
- v) Determine the **y-intercept**: _____
- vi) List any **local maximums**: _____
- vii) List any **local minimums**: _____
- vi) **Average Rate of Change** on: _____
the interval $(0, 3)$

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



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

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

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

c. $h(x) = x^5 - 4$

d. $m(x) = x^4 + 3x^2 + 2$

e. $p(x) = 2^x$

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

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:
 $f(-x) = -f(x)$