1. Given 

\[ f(x) = \begin{cases} 
-4, & x < -2 \\
-x^2, & -2 \leq x < 0 \\
x^3, & x \geq 0 
\end{cases} \]

Find each of the following:

a) \( f(-2) = -4 \)  \( f(0) = 0 \)  \( f(-5) = -4 \)

b) Graph the \( f(x) \)

c) Where is \( f(x) \) increasing? \((-2, \infty)\)

d) Where is \( f(x) \) decreasing? \(-\infty, -2\)

e) Where is \( f(x) \) constant? \([-2, 0]\)

f) Is \( f(x) \) continuous? \(\text{yes}\)

2. Given \( k(x) = \begin{cases} 
\sqrt{x-3} + 1, & \text{if } x > 4 \\
-(x+2)^2, & \text{if } -3 \leq x \leq 1 \\
-3, & \text{if } x < -5 
\end{cases} \)

a) Graph the \( k(x) \)

b) Where is \( k(x) \) increasing? \((-3, 2) \cup (3, \infty)\)

c) Where is \( k(x) \) decreasing? \((-2, 1)\)

d) Where is \( k(x) \) constant? \((-\infty, -5)\)

e) Where is the relative max? \(x = -2\)

f) What is the relative max? \(0\)

g) Is \( k(x) \) continuous? \(\text{no}\)
Verify algebraically whether each function is even, odd, or neither. (Show work)

3. \( f(x) = 2x^2 + 5 \)
   \[ f(-x) = 2(-x)^2 + 5 \]
   \[ f(-x) = 2x^2 + 5 \]
   \[ f(x) = f(-x) \] **Even**

4. \( g(x) = -x^3 - 4x + 1 \)
   \[ g(-x) = -(x)^3 - 4(-x) + 1 \]
   \[ g(-x) = -x^3 + 4x + 1 \]

   **neither**

5. \( h(x) = x^3 + 2x \)
   \[ h(-x) = (-x)^3 + 2(-x) \]
   \[ h(-x) = -x^3 - 2x \]
   \[ h(-x) = -h(x) \] **Odd**

6. \( f(x) = 2|x| - 4 \)
   \[ f(-x) = 2|-x| - 4 \]
   \[ f(-x) = 2|x| - 4 \]
   \[ f(-x) = f(x) \] **Even**

7. \( g(x) = \sqrt[3]{2x} \)
   \[ g(-x) = \sqrt[3]{2(-x)} \]
   \[ g(-x) = \sqrt[3]{-2x} \]
   \[ g(-x) = -g(x) \] **Odd**

8. \( h(x) = \sqrt{x} + 6 \)
   \[ h(-x) = \sqrt{-x} + 6 \]
   \[ h(-x) = \sqrt{x} + 6 \]
   **neither**

9. Finish the graph given the symmetry.

   a. x-axis
   b. origin
   c. y-axis

Given the graph of \( f(x) \) above, answer the following:

a) Domain: \( (-\infty, 0) \cup (0, \infty) \)  
   Range: \( (-\infty, 1] \)

b) Where is \( f(x) \) increasing? \( (-\infty, -2) \)

c) Where is \( f(x) \) decreasing? \( (2, \infty) \)

d) Where is \( f(x) \) constant? \( [-2, 2] \)

e) Is \( f(x) \) even, odd or neither? **Even**

f) Find \( f(4) = \frac{1}{16} \)

g) What value(s) of \( x \) is \( f(x) = -3 \)? \( -6 \) or \( 6 \)

h) Is \( f(x) \) continuous? **Yes**