*Review 3.1(****Key****)*

1. Each of the following graphs is a family member of one of the basic functions.

 Determine the basic function in each case.

 a. b.

  

 **a. *f*(*x*) =** $\sqrt{x}$ **b. *f*(*x*) = *x*3**

2. Determine algebraically whether each of the following functions is even, odd, or neither.

 Confirm your answer graphically.

 a. $f(x)= -3x^{3} - 5x$

$f(-x)=-3\left(-x\right)^{3} - 5(-x)$$=$$3x^{3}+ 5x$ **Since** $f(-x)$ **=** $-f(x)$**, this function is odd.**

 ** Graph confirms function is symmetric about the origin.**

 b. $f(x)=x^{2}-4 $

$f(-x)=\left(-x\right)^{2}- 4$$=$$x^{2}-4$ **Since** $f(-x)$ **=** $f(x)$**, this function is even.**

  **Graph confirms function is symmetric about the *y*-axis.**

 c. $f\left(x\right)=x^{2}+ x-4 $

$f\left(-x\right)=\left(-x\right)^{2}+ \left(-x\right)-4$$=$$x^{2}-x-4$

 **Since** $f(-x)$$\ne $$f(x)$**, and** $f(-x)$$\ne $$-f(x)$**, this function is neither even nor odd.**

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 **Graph is not symmetric about the *y*-axis; not symmetric about the origin.**

3. Use the graph of the function to answer the following.

 a. Find the domain and range.

 b. Determine the increasing intervals.

 c. State any relative minima in ordered pair form.

 d. State relative maxima in ordered pair form.

 e. Determine the zeros, if any exist.



 **a. Domain:** $(-5, \infty )$ **Range:**$ [-3, \infty ) $

 **b. Increasing:** $(-5, -4), (-2, 0), (3, \infty )$

 **c. Relative minima:** $(-2, -2)$ **and** $(3, -3)$

 **d. Relative maxima:** $(-4, 5)$ **and** $(0, 0)$

 **e. Zeros:** $\left(-2.3, 0\right), \left(0, 0\right), (4, 0)$

4. Use your grapher to find the zeros of $f(x)=-x^{3}- 4x^{2}+ 6$. Provide your graph and

 round any non-integer values to three decimal places.

 **Use the calculator “zero” feature:**

**  **

 **Zeros: *x* =** $-$**3.514;** $-$**1.572; 1.086**

 **Ordered pair form:** $\left(-3.514, 0\right), \left(-1.572, 0\right), (1.086, 0)$