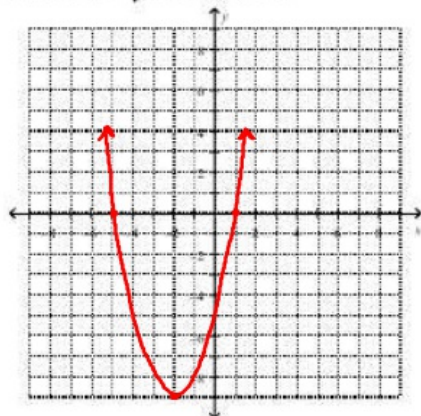


APPEARANCE OF FUNCTIONS AND THEIR ROOTS

The following statements are equivalent:

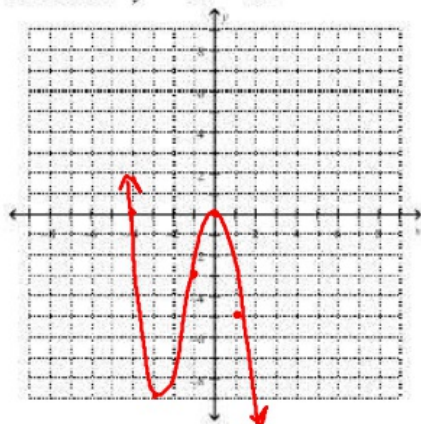
- k is a zero of the polynomial function, f
- $(x - k)$ is a factor of $f(x)$
- k is a solution of the polynomial equation $f(x) = 0$
- k is an x -intercept for the graph $y = f(x)$

1. Sketch: $y = x^2 + 4x - 5$



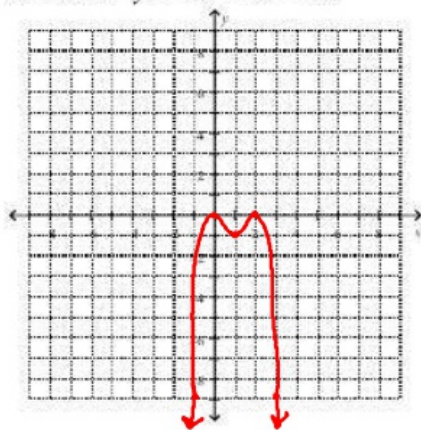
- (a) What are the zeros? $x = -5$ $x = 1$
- (b) What are the factors? $(x+5)(x-1)$
- (c) What is the factored form of $y = x^2 + 4x - 5$? $y = (x+5)(x-1)$
- (d) How many real solutions does the polynomial have? 2
- (e) Describe the end behaviors of the function: right up
 left up

2. Sketch: $y = -x^3 - 4x^2$



- (a) What are the zeros? $x = -4$ $x = 0$ \rightarrow double root
- (b) What are the factors? $-(x+4)x^2$
- (c) What is the factored form of $y = -x^3 - 4x^2$? $y = -x^2(x+4)$
- (d) How many real solutions does the polynomial have? 3
- (e) Describe the end behaviors of the function: right down
 left up

3. Sketch: $y = -x^4 + 4x^3 - 4x^2$



$$\begin{aligned} y &= -x^2(x^2 - 4x + 4) \\ &= -x^2(x-2)(x-2) \\ &= -x^2(x-2)^2 \end{aligned}$$

- (a) What are the zeros? $x=0$ $x=2$ (both double roots)
- (b) What are the factors? $x, (x-2)$
- (c) What is the factored form of $y = -x^4 + 4x^3 - 4x^2$? $y = -x^2(x-2)^2$
- (d) How many real solutions does the polynomial have? 4 (2 were double roots)
- (e) Describe the end behaviors of the function: right down, left down
4. (a) Write the equation of the simplest polynomial function with zeros -2 and 2 .

$$y = (x+2)(x-2)$$

Equation of the polynomial: $y = x^2 - 2x + 2x - 4$ $y = x^2 - 4$

- (b) What is the degree of this polynomial? 2
- (c) How many real roots does this polynomial have? 2
- (d) How many imaginary roots does this polynomial have? 0

5. Write the equation of the simplest polynomial function with zeros $-4, 0$ and 1 .

$$\begin{aligned} y &= (x+4) \cdot x (x-1) \\ y &= x (x+4)(x-1) \\ y &= x (x^2 + 3x - 4) \end{aligned}$$

Equation of the polynomial: $y = x^3 + 3x^2 - 4x$

- (b) What is the degree of this polynomial? 3
- (c) How many real roots does this polynomial have? 3
- (d) How many imaginary roots does this polynomial have? 0

6. Write the equation of the simplest 4th degree polynomial function with a double roots at $x = 0$ and $x = 1$.

$$\begin{aligned} y &= x^2(x-1)^2 \\ y &= x^2(x-1)(x-1) = x^2(x^2 - 2x + 1) \end{aligned}$$

Equation of the polynomial: $y = x^4 - 2x^3 + x^2$

- (b) What is the degree of this polynomial? 4
- (c) How many real roots does this polynomial have? 4
- (d) How many imaginary roots does this polynomial have? 0

7. Write the equation of the simplest polynomial function with zeros -4 and $\frac{1}{2}$.

Equation of the polynomial: _____

(b) What is the degree of this polynomial? _____

(c) How many real roots does this polynomial have? _____

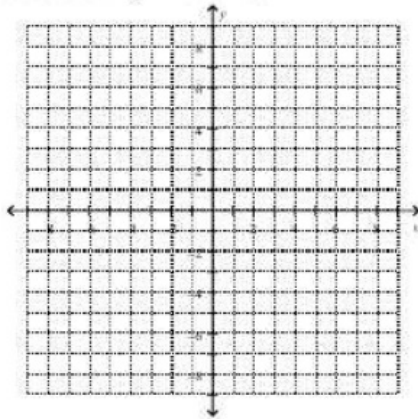
(d) How many imaginary roots does this polynomial have? _____

Algebra Two

Name: _____ Date: _____

HOMEWORK - APPEARANCE OF FUNCTIONS AND THEIR ROOTS

8. Sketch: $y = -x^2 + 6x$



(a) What are the zeros? _____

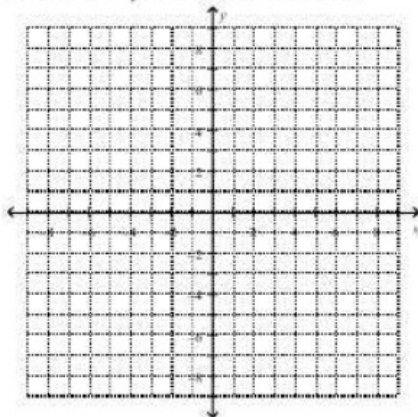
(b) What are the factors? _____

(c) What is the factored form of $y = -x^2 + 3x$? _____

(d) How many real solutions does the polynomial have? _____

(e) Describe the end behaviors of the function: _____

9. Sketch: $y = x^3 - 2x^2 - 4x + 8$



(a) What are the zeros? _____

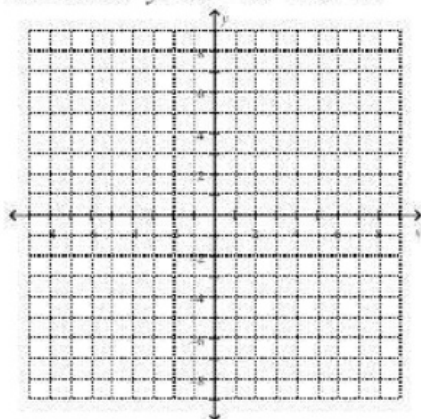
(b) What are the factors? _____

(c) What is the factored form of $y = x^3 - 2x^2 - 3x$? _____

(d) How many real solutions does the polynomial have? _____

(e) Describe the end behaviors of the function: _____

10. Sketch: $y = x^4 - 4x^3 + 4x^2 + 1$



- (a) What are the zeros? _____
- (b) What are the factors? _____
- (c) What is the factored form of $y = x^4 - 5x^2 + 4$? _____
- (d) How many real solutions does the polynomial have? _____
- (e) Describe the end behaviors of the function: _____

11. (a) Write the equation of the simplest polynomial function with zeros -3 and 6 .

Equation of the polynomial: _____

- (b) What is the degree of this polynomial? _____
- (c) How many real roots does this polynomial have? _____
- (d) How many imaginary roots does this polynomial have? _____

12. Write the equation of the simplest polynomial function with zeros -1 , 0 and 5 .

Equation of the polynomial: _____

- (b) What is the degree of this polynomial? _____
- (c) How many real roots does this polynomial have? _____
- (d) How many imaginary roots does this polynomial have? _____

13. Write the equation of the simplest 4th degree polynomial function with roots at 1 and 2 and a double root at $x = 0$.

Equation of the polynomial: _____

- (b) What is the degree of this polynomial? _____
- (c) How many real roots does this polynomial have? _____
- (d) How many imaginary roots does this polynomial have? _____

14. Write the equation of the simplest polynomial function with zeros 1 and $\frac{1}{2}$.

Equation of the polynomial: _____

- (b) What is the degree of this polynomial? _____
- (c) How many real roots does this polynomial have? _____
- (d) How many imaginary roots does this polynomial have? _____