Homework 4.9: Writing Polynomials

Name: _____

Math 3

Directions: State whether (x – 3) is a factor.

1. $f(x) = x^3 - 9x + 3$

$f(3) = 3$

Not a factor

2. $f(x) = x^3 - 9x^2 + 27x - 28$

$f(3) = -1$

Not a factor

3. $f(x) = 2x^3 - 2x - 49$

$f(3) = -1$

Not a factor

Directions: Write the polynomial function in standard form when given the leading coefficient and the zeros of the function.

4. Leading coefficient: 2; roots: $2, \sqrt{2}, -\sqrt{2}$

$x = 2 \quad x = \sqrt{2} \quad x = -\sqrt{2}$

$(x-2)(x-\sqrt{2})(x+\sqrt{2})$

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

$f(x) = 2(x^3 - 2x^2 + 2x - 4)$

$f(x) = 2x^3 - 4x^2 + 2x - 8$

5. Leading coefficient: -1; roots: $1, 1+\sqrt{3}, 1-\sqrt{3}$

$x = 1 \quad x = 1+\sqrt{3} \quad x = 1-\sqrt{3}$

$(x-1)(x-1-\sqrt{3})(x-1+\sqrt{3})$

$(x-1)(x^2-2x-2)$

$= x^3 - x^2 - 2x^2 + 2x - 2x + 2$

$f(x) = -1(x^3 - 3x^2 + 2)$

$f(x) = -x^3 + 3x^2 - 2$

	x	-1	$-\sqrt{3}$
x	x^2	$-x$	$-x\sqrt{3}$
-1	$-x$	$+1$	$+\sqrt{3}$
$+\sqrt{3}$	$+x\sqrt{3}$	$-\sqrt{3}$	-3

6. Leading coefficient: 2; roots: $4i, -4i$

$x = 4i \quad x = -4i$

$(x-4i)(x+4i)$

(x^2+16)

$f(x) = 2(x^2+16)$

$f(x) = 2x^2 + 32$

7. Function: $f(x) = x^3 + 2x^2 - 4x - 8$

$(x+2)(x+2)(x-2)$

$(x^2+4x+4)(x-2)$

$x^3 - 2x^2 + 4x^2 - 8x + 4x - 8$

$x^3 + 2x^2 - 4x - 8$

End Behavior:

as $x \to -\infty$, $f(x) \to \underline{-\infty}$

as $x \to \infty$, $f(x) \to \underline{\infty}$

Roots (with Multiplicity):

$(-2, 0)$ M: 2

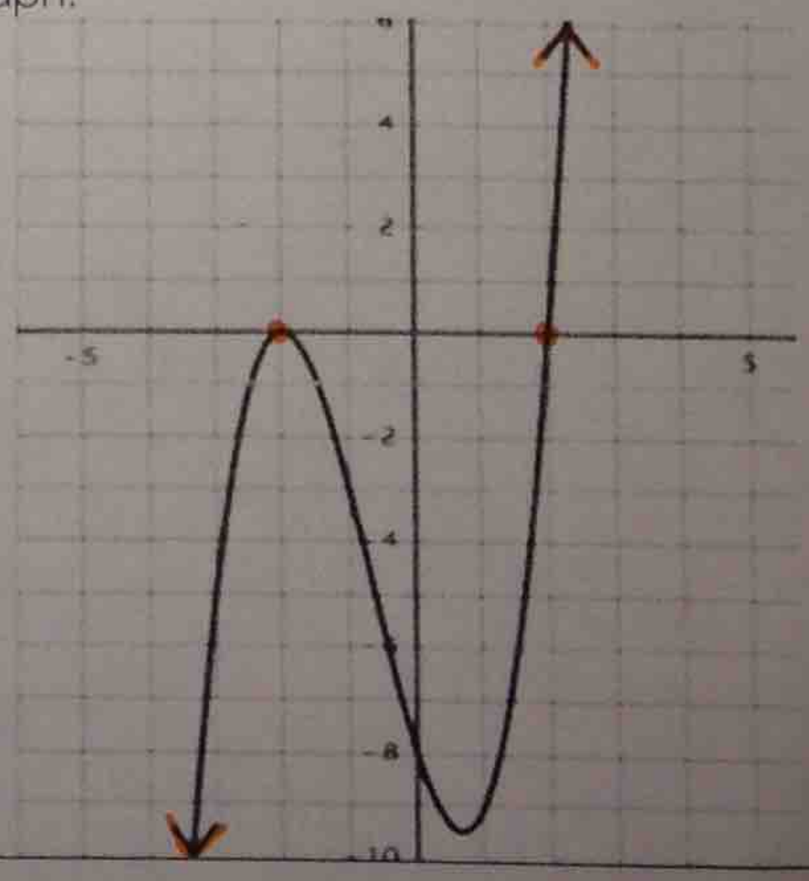
$(2, 0)$ M: 1

Value of the leading coefficient: 1

Domain: $(-\infty, \infty)$

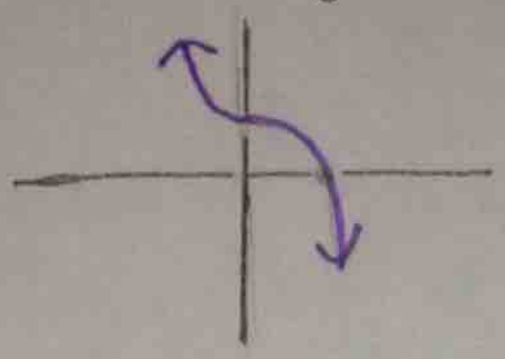
Range: $(-\infty, \infty)$

Graph:

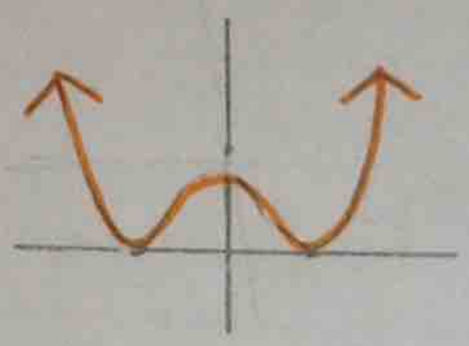


Directions: Without using technology, sketch the graph of the polynomial function described.

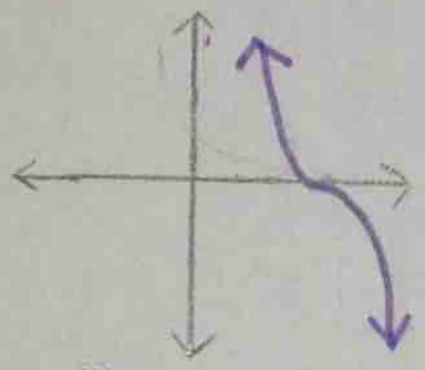
8. A cubic function with a leading coefficient of -2, with one positive zero.



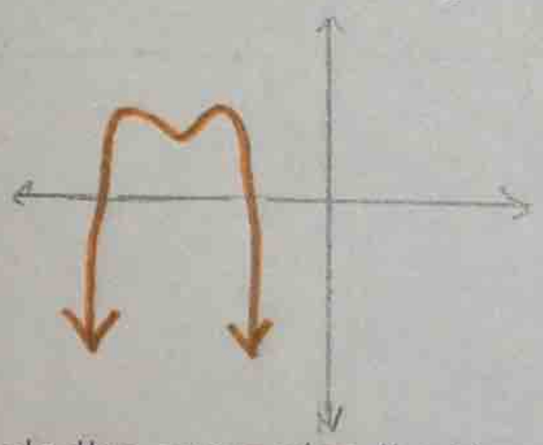
9. A quartic function with a leading coefficient of 1, with two double zeros.



10. A cubic function with a leading coefficient of -3, with one positive triple root.



11. A quartic function with a leading coefficient of -2, with two negative zeros and two complex (imaginary) roots.



Directions: Circle the expression that has the greatest value of f(x) as $x \to \infty$.

12. 2^x $\quad x^2 - 2x + 10$ $\quad x + 5$ $\quad \log x$

13. $(\frac{1}{2})^x$ $\quad x^2 - 2x + 10$ $\quad x^5 - 4x^2$ $\quad 3\sqrt{x}$

14. $3 \cdot 2^x$ $\quad x^3 + x^2 - 4$ $\quad 2(3^x)$ $\quad x^{10}$