#4 Pre-Calculus Worksheet

Long and Synthetic Division

Name: Key

Period:

Divide using **LONG DIVISION**

1. $\frac{2x^4-7x^3+120x+9}{x+3}$ $2x^3-13x^2+39x+3$ $x+3 \overline{)2x^4-7x^3+0x^2+120x+9}$ $-2x^4+6x^3$ $-13x^3+0x^2$ $+13x^3+39x^2$ $39x^2+120x$ $-39x^2+117x$ $3x+9$ $-3x+9$ 0 $\boxed{2x^3-13x^2+39x+3}$	2. $\frac{4x^4-14x^3-14x^2+110x-84}{2x^2+x-12}$ $2x^2-8x+9+\frac{5x+24}{2x^2+x-12}$

Divide using **SYNTHETIC DIVISION**

3. $\frac{x^4-x^3+3x^2-6x-6}{x-2}$ $\begin{array}{r\|rrrr\|r} 2 & 1 & -1 & 3 & -6 & -6 \\ & & 2 & 2 & 10 & 8 \\ \hline & 1 & 1 & 5 & 4 & 2 \end{array}$ $x^3+x^2+5x+4+\frac{2}{x-2}$	4. $\frac{3x^4-9x^3-24x-48}{x+4}$ $3x^3-21x^2+84x-360+\frac{1392}{x+4}$	5. $\frac{12x^5+10x^4-18x^3-12x^2-6}{2x-3}$ $\begin{array}{r\|rrrrr\|r} \frac{3}{2} & 12 & 10 & -18 & -12 & 0 & -6 \\ & & 18 & 42 & 36 & 36 & 54 \\ \hline & 12 & 28 & 24 & 24 & 36 & 48 \end{array}$ $\div 2$ $\boxed{6x^4+14x^3+12x^2+12x+18+\frac{48}{2x-3}}$
6. Use synthetic substitution to evaluate $f(x)=20x^4-8x^3+25x^2+50x-16$ for $f(-5)$. $f(-5)=-61,141$	7. Find $h(-2.3)$ using synthetic substitution $h(x)=2x^3+3x^2-7x+1$. $\begin{array}{r\|rrr\|r} -2.3 & 2 & 3 & -7 & 1 \\ & & -4.6 & 3.68 & 7.636 \\ \hline & 2 & -1.6 & -3.32 & \boxed{8.636} \end{array}$ $h(-2.3)=8.636$	8. Use synthetic division to determine if $(x-2)$ is a factor of the polynomial $(3x^3-5x^2+x-2)$. Why or why not? NO.

9. Use synthetic division to determine if $(3x-2)$ is a factor of the polynomial $(3x^4+7x^3-10x+4)$. Why or why not?

$\frac{2}{3}$	3	7	0	-10	4
		2	6	4	-4
	3	9	6	-6	0

yes, because the remainder is zero.

10. Determine k so that the function $h(x)=2x^3+5x^2+kx-16$ has the binomial factor $x-2$.

K = -10

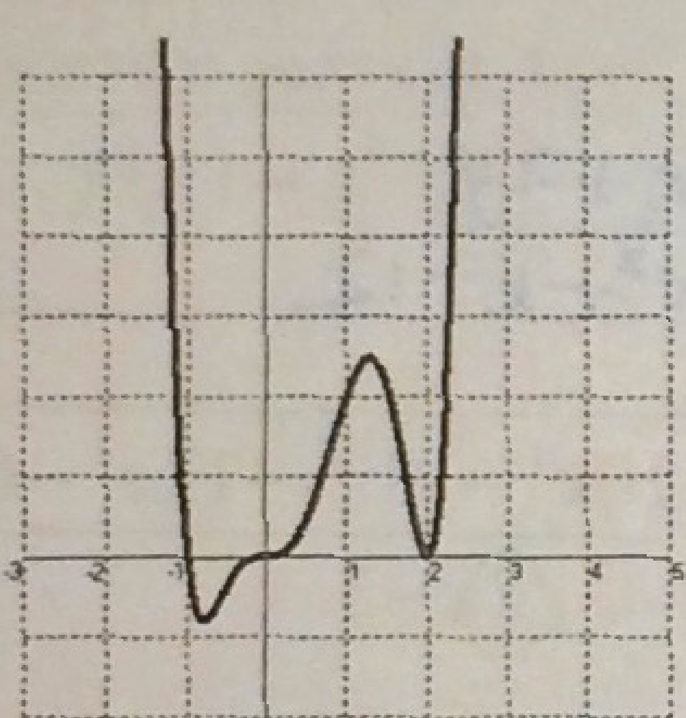
11. Determine k so that the function $h(x)=x^4-2x^3-kx+6$ has the binomial factor $x+3$.

-3	1	-2	0	-K	6
		-3	15	-45	3K+135
	1	-5	15	(-K-45)	0

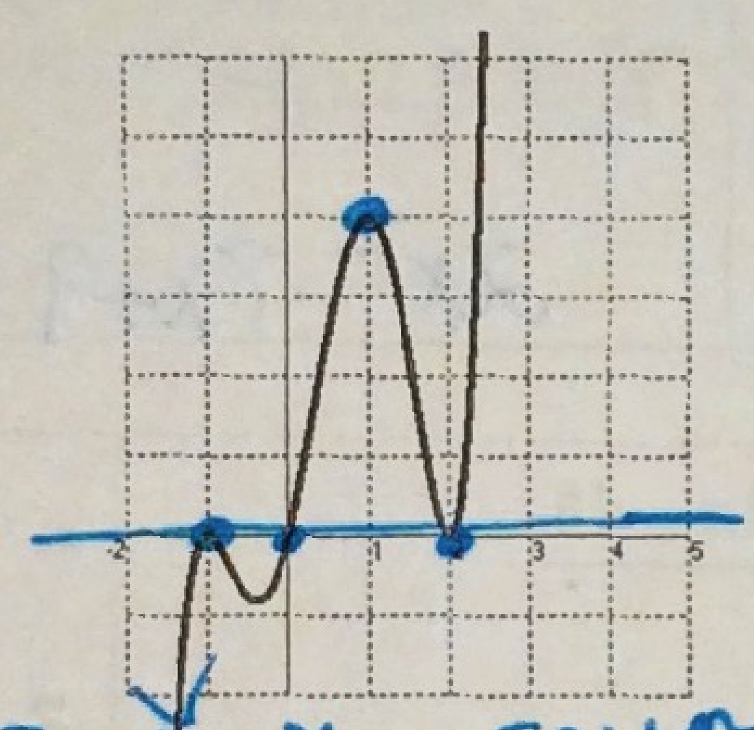
3K+135+6=0
3K=-141
K=-47

Determine an equation for the polynomial graph.

12. Degree 6



13. Degree 5

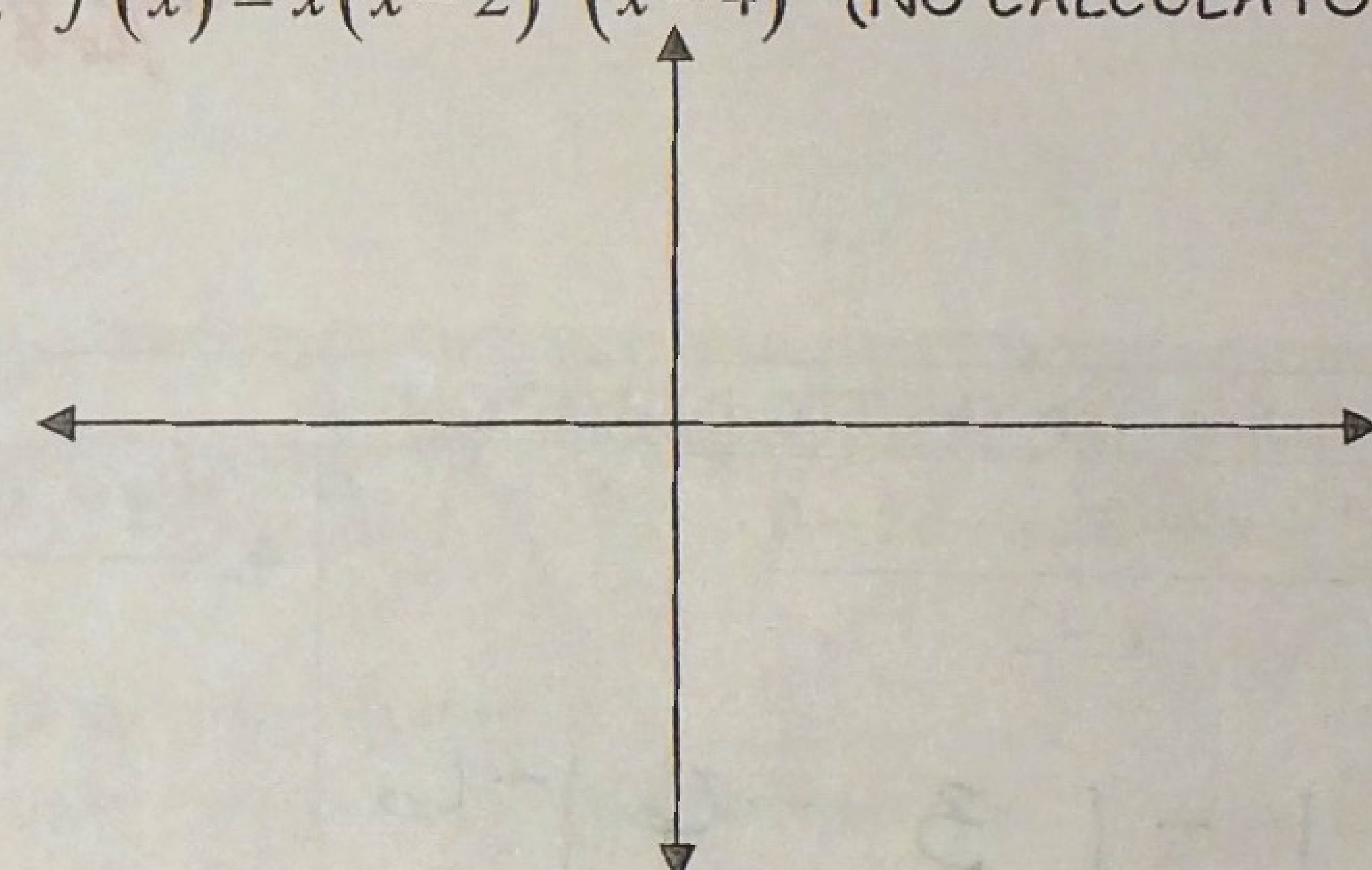


Roots	M	EB: ↓↑ odd +
-1	2	
2	2	
0	1	

$\boxed{f(x) = x(x+1)^2(x-2)^2}$

Graph each function WITHOUT using a graphing utility.

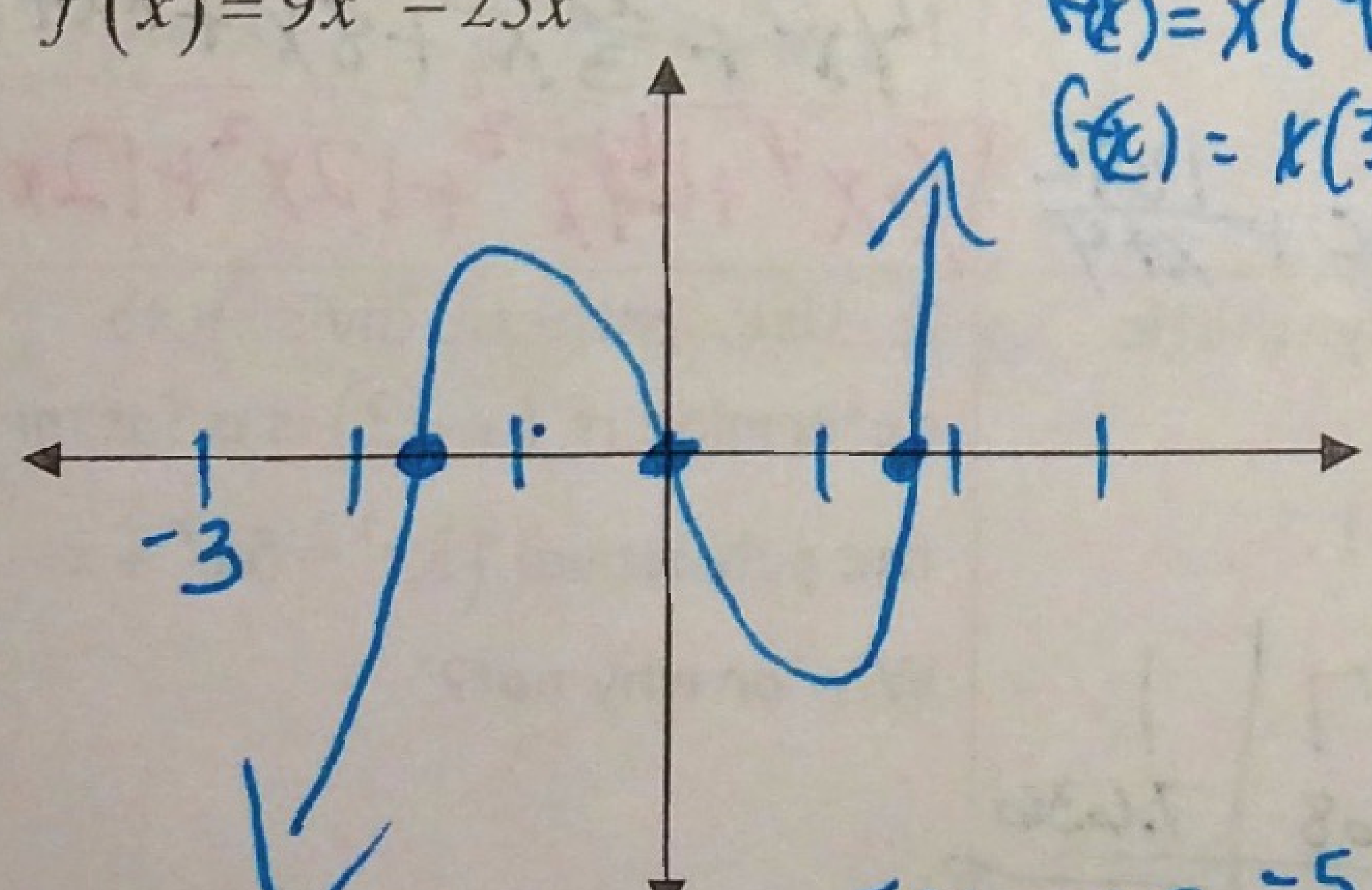
14. $f(x)=x(x-2)^2(x-4)$ (NO CALCULATOR)



Graph each function WITHOUT using a graphing utility.

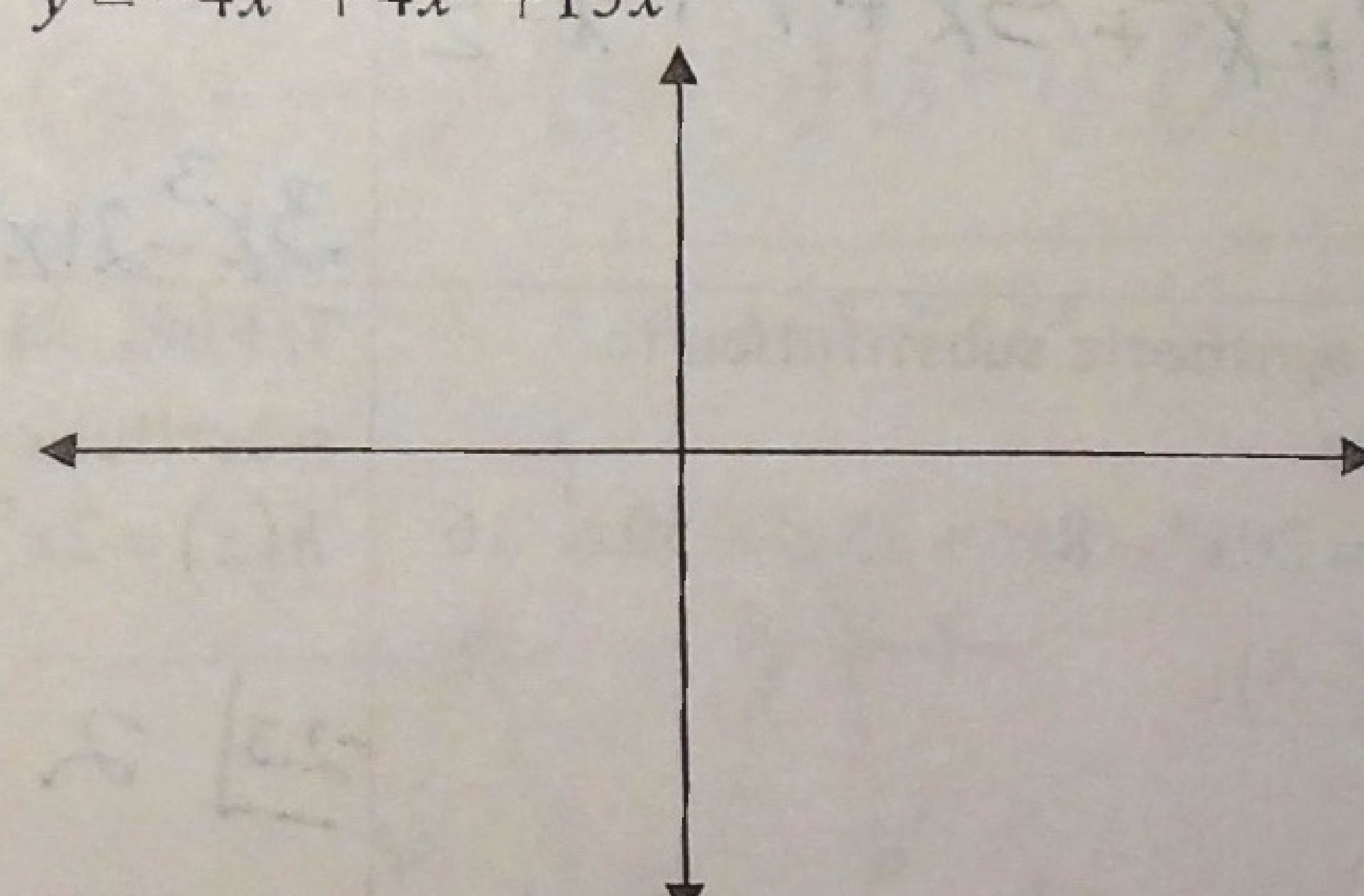
15. $f(x)=9x^3-25x$

$f(x)=x(9x^2-25)$
$f(x)=x(3x+5)(3x-5)$



zero: $0, \frac{-5}{3}, \frac{5}{3}$

16. $y=-4x^3+4x^2+15x$



Use a graphing utility to graph each function. Determine each zero and the number of relative extrema. Then express the function as a product of linear factors.

17. $f(x)=-x^3+3x^2+4x-12$

Real zeroes: 3 Roots: -2, 2, +3
Number of Relative Extrema: 2
Factored Form of Equation:
$f(x) = -(x+2)(x-2)(x-3)$

18. $f(x)=x^4+6x^3+9x^2$

Real zeroes: ______
Number of Relative Extrema: ______
Factored Form of Equation: