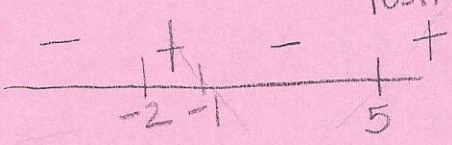
HW 9-1
Polynomial Inequalities

Name Answer Key
Period _____

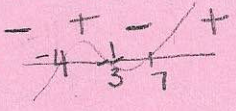
Part 1: Determine the x-values that cause the polynomial to be (**a**) zero, (**b**) positive, (**c**) negative.

1. $f(x) = (x + 2)(x + 1)(x - 5)$

Zero: $-2, -1, 5$
Positive: $(-2,-1)(5,\infty)$
Neg: $(-\infty,-2)(-1,5)$

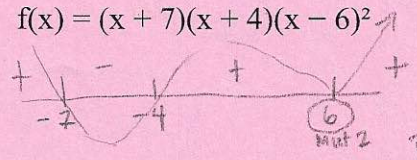


2. $f(x) = (x - 7)(3x + 1)(x + 4)$



Zero: $7, -\frac{1}{3}, -4$
Positive: $(-4, -\frac{1}{3})(7, \infty)$
Negative: $(-\infty, -4) \cup (-\frac{1}{3}, 7)$

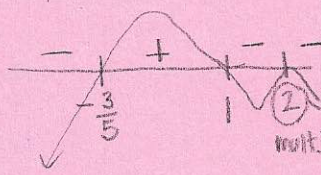
3. $f(x) = (x + 7)(x + 4)(x - 6)^2$



Pos $(-\infty,-7)(-4,6)(6,\infty)$
Zero: $-7, -4, 6$(mult. 2)
Neg $(-7,-4)$

4. $f(x) = (5x + 3)(x - 1)(x - 2)^3$

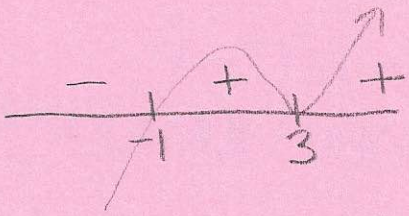
Zero: $-\frac{3}{5}, 1, 2$(mult 3)



Positive $(-\frac{3}{5}, 1)$
Neg $(-\infty, -\frac{3}{5}) \cup (1,2) \cup (2,\infty)$

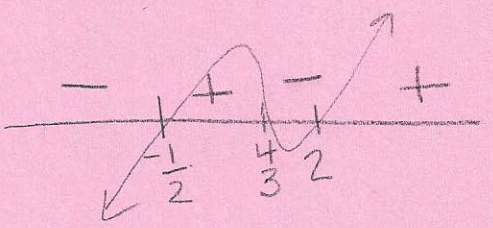
Part 2: Solve the inequality using a sign chart. Complete the factoring if needed. Write your answer in interval notation.

5. $(x + 1)(x - 3)^2 > 0$



$(-1,3) \cup (3,\infty)$

6. $(2x + 1)(x - 2)(3x - 4) \leq 0$

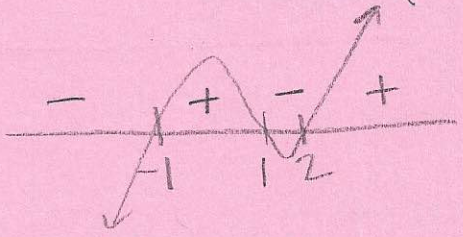


$(-\infty, -\frac{1}{2}] \cup [\frac{4}{3}, 2]$

7. $(x + 1)(x^2 - 3x + 2) < 0$

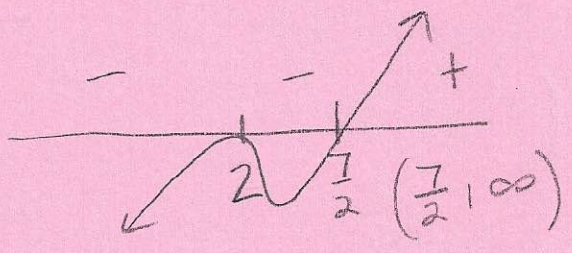
$(x+1)(x-2)(x-1) < 0$

$(-\infty,-1) \cup (1,2)$



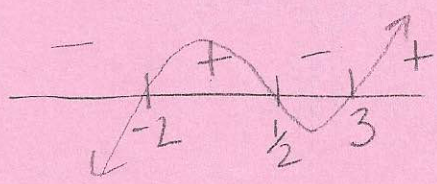
8. $(2x - 7)(x^2 - 4x + 4) > 0$

$(2x-7)(x-2)(x-2) > 0$



$(\frac{7}{2}, \infty)$

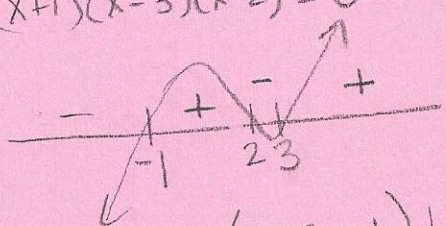
9. $(x + 2)(2x - 1)(x - 3) \geq 0$



$[-2, \frac{1}{2}] \cup [3,\infty)$

10. $(x + 1)(x^2 - 5x + 6) \leq 0$

$(x+1)(x-3)(x-2) \leq 0$



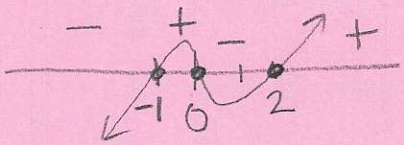
$(-\infty,-1) \cup (2,3)$

11. $x^3 - x^2 - 2x \geq 0$

$x(x^2 - x - 2) \geq 0$

$x(x-2)(x+1) \geq 0$

$[-1, 0] \cup [2, \infty)$

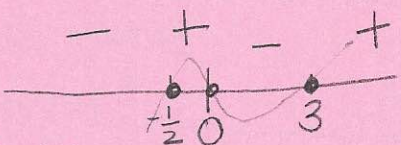


12. $2x^3 - 5x^2 + 3x < 0$

$x(2x^2 - 5x + 3)$

$x(2x+1)(x-3)$

$(-\infty, -\frac{1}{2}) \cup (0, 3)$



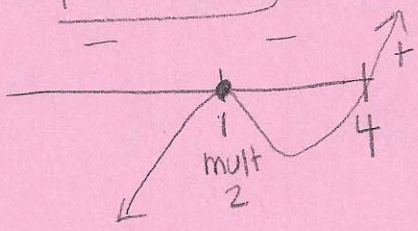
13. $x^3 - 4x^2 - x + 4 \leq 0$

$(-\infty, 4]$

1	1	-4	-1	4
	↓	1	-3	-4
	1	-3	-4	0

$x^2 - 3x - 4$

$(x-4)(x+1)$



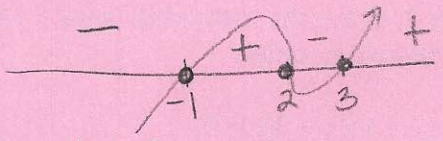
14. $x^3 - 4x^2 + x + 6 \leq 0$

-1	1	-4	1	6
	↓	-1	5	-6
	1	-5	6	0

$x^2 - 5x + 6$

$(x-3)(x-2)$

$(-\infty, -1) \cup (2, 3)$



Review

Find the factors of the following polynomials

1. $f(x) = 2x^3 - x^2 - 13x - 6$

6: 1, 2, 3, 6

2: 1, 2

3	2	-1	-13	-6
	↓	6	15	6
	2	5	2	0

$(x-3)(2x^2 + 5x + 2)$

$(x-3)(2x+1)(x+2)$

2. $g(x) = x^4 - 5x^2 + 4$

$(x^2 - 1)(x^2 - 4)$

$(x-1)(x+1)(x-2)(x+2)$

Factor the following:

3. $16n^3 - 2n^2 + 24n - 3$

$2n^2(8n-1) + 3(8n-1)$

$(2n^2 + 3)(8n-1)$

4. $25p^2 - 16$

$(5p-4)(5p+4)$

5. $9x^2 + 6x + 1$

$(3x+1)^2$

6. $x^4 - 4x^2 - 45$

$(x^2 - 9)(x^2 + 5)$

$(x-3)(x+3)(x^2+5)$