Name: _____ Per: _____ Date: _____

Serafino • Algebra 2E

4R Polynomials – Unit Review

This is NOT everything – you should go through the worksheets and practice the skills you got wrong on skills checks & quizzes.

1. Describe end behavior and the y–intercept of: $f(x) = -3x^2(2x-3)^2$ $g(x) = \frac{1}{2}x^5 + 2x^3 - 4$

2. If $f(x) = 2x^2$ $g(x) = x^3 - 2$

   a. What $f(x) - g(x)$ in standard form? What is the y–intercept?

   b. What is $-g(2x) + 10$? What is the y–intercept?

   c. is $3f(x-1) + 5$ in standard form and what is the y–intercept?

3. Write the polynomial function that has x–intercepts at –3 and $i5\sqrt{2}$ and a y–intercept of –30. Write it in intercept form and standard form. Also sketch it.

4. $g(x) = x^3 - 3x^2 - x + 3$. What is the average rate of change between $-2 \le x \le 4$?

5. Sketch $f(x) = -(x+6)^8(x-3)^6(x+1)$. Include x and y–intercepts.

6. Sketch $f(x) = x^6 - 11x^5 + 30x^4$. Include x and y intercepts.

7. Where is $-x(x-2)^2(x+3)^3(x-6) \le 0$? Sketch your solution on a number line.

8. A polynomial has a minimum at (2, –8) and a maximum at (–5, 2). Where is the function increasing? Sketch your solution on a number line.

9. What is the value of k such that $x^3 + 2x^2 + kx + 6$ contains (–1, 10)

10. Divide using long division: $(3x^3 + 2x^2 - 5x + 7) \div (x^2 + 2x)$.

*The test will also include any / all material covered on the 4A and 4B skills checks. Those are really the "quizzes" of this unit, so you already have the material to study those skills.

4R: Polynomials Unit Review

1. $f(x)$ is "down and down", y-int (0,0)
   $g(x)$ is "down and up", y-int (0,-4)

2. a) $f(x) - g(x)$
   $(2x^3) - (x^3 - 2) = \boxed{-x^3 + 2x^2 + 2}$

   b) $-g(2x) + 10$
   $-[(2x)^3 - 2] + 10$
   $-[8x^3 - 2] + 10$
   $-8x^3 + 2 + 10$
   $\boxed{-8x^3 + 12}$, y-int (0,12)

   c. $3f(x-1) + 5$
   $3[2(x-1)^2] + 5$
   $3[2(x^2 - 2x + 1)] + 5$
   $3(2x^2 - 4x + 2) + 5$
   $6x^2 - 12x + 6 + 5$
   $= \boxed{6x^2 - 12x + 11}$, (0,11)

3. x: $-3, 5i\sqrt{2}, -5i\sqrt{2}$

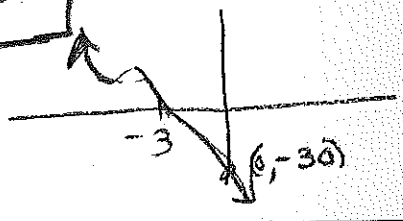
   $y = a(x+3)(x - 5i\sqrt{2})(x + 5i\sqrt{2})$
   $y = a(x+3)(x^2 + 50)$

   y-int $= -30$, so $-30 = a(0+3)(0+50)$
   $\frac{-30}{150} = \frac{150a}{150}$ $\quad a = -\frac{1}{5}$

   $\boxed{y = -\frac{1}{5}(x+3)(x^2+50)}$

   or $\boxed{y = -\frac{1}{5}x^3 - \frac{3x^2}{5} - 10x - 30}$

   $-\frac{1}{5}(x^3 + 50x + 3x^2 + 150)$



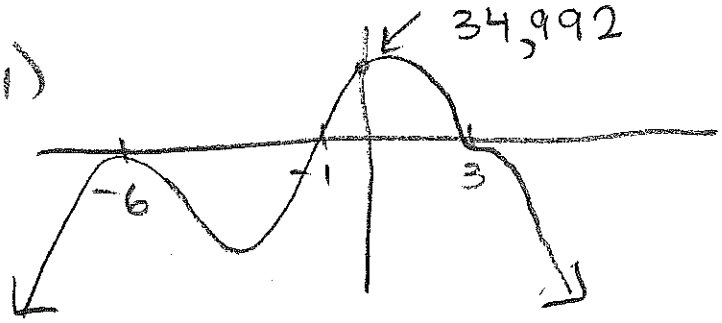
4.

$$\begin{array}{r|rrrr} -2 & 1 & -3 & -1 & 3 \\ & & -2 & 10 & -18 \\ \hline & 1 & -5 & 9 & -15 \end{array}$$

$$\begin{array}{r|rrrr} 4 & 1 & -3 & -1 & 3 \\ & & 4 & 4 & 12 \\ \hline & 1 & 1 & 3 & 15 \end{array}$$

$$\frac{\Delta y}{\Delta x} = \frac{30}{6} = \boxed{5}$$

5. $y = -(x+6)^4(x-3)^3(x+1)$

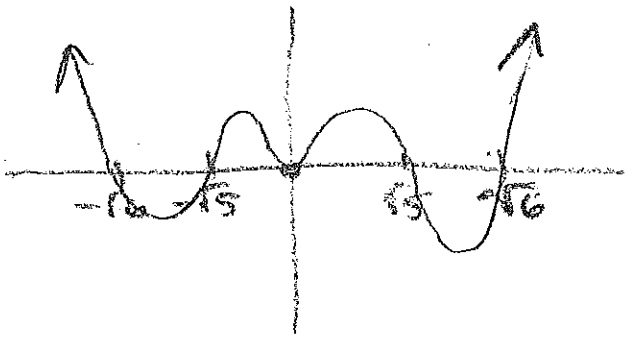


6. $y = x^8 - 11x^6 + 30x^4$

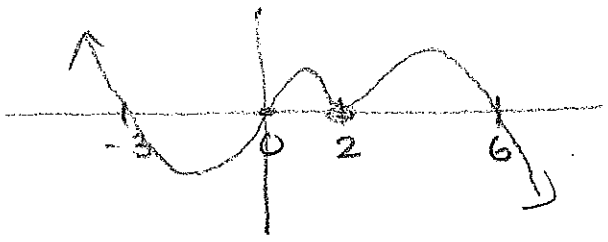
$x^2\left[x^4 - 11x^2 + 30\right]$

$x^2(x^2-6)(x^2-5)^2$

$x = 0^{(2)}, \sqrt{6}, -\sqrt{6}, \sqrt{5}, -\sqrt{5}$

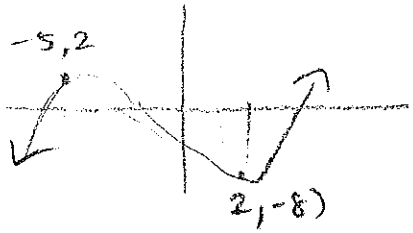


7. $-x(x-2)^2(x+3)^3(x-6) \leq 0$

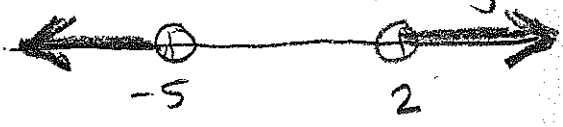


$f(x) \leq 0$

8.



f(x) increasing



9. Can do two ways.

$10 = (-1)^3 + 2(-1)^2 + k(-1) + 6$

$10 = -1 + 2 - k + 6$

$10 = 7 - k$

$-7 \quad -7$

$3 = -k$

$\boxed{k = -3}$

or...

$-1 \;\big|\; 1 \quad 2 \quad k \quad 6$

$\qquad\quad -1 \quad -1 \quad -k+1$

$1 \quad 1 \quad k-1 \quad -k+7 = 10$

$-k = 3$

$\boxed{k = -3}$

10.

$$x^2+2x \;\overline{)\; 3x^3 + 2x^2 - 5x + 7}$$

$3x - 4$

$-(3x^3 + 6x^2)$

$-4x^2 - 5x$

$+(-4x^2 - 8x)$

$3x + 7$

$$\boxed{3x - 4 + \frac{3x+7}{x^2+2x}}$$