

Bellwork: Do #14 from 3.1 on a half-sheet of paper

$$(\sqrt{2x-1})^2 = (x-2)^2$$

$$2x-1 = x^2 - 4x + 4$$

$$-2x+1 \quad -2x+1$$

$$0 = x^2 - 6x + 5$$

$$0 = (x-5)(x-1)$$

$$x=5 \quad x$$

$$\begin{array}{r} 5 \\ \times -1 \\ \hline -5 \\ \hline -6 \end{array}$$

CHECK 5: ✓

$$\sqrt{2(5)-1} = 5-2$$

$$\sqrt{9} = 3$$

CHECK 1: ✗

$$\sqrt{2(1)-1} = 1-2$$

$$\sqrt{1} \neq -1$$

Homework 3.1 Solutions

- 1. 11 9. No solution 15) $2 \cdot 2\sqrt{2x-5}$
- 3. 13 11. -125 $(\sqrt{4x-3})^2 = (2+\sqrt{2x-5})^2$
- 5. 39 13. 9 $4x-3 = 4 + 4\sqrt{2x-5} + 2x-5$
- 7. 33 15. 7, 3 $-2x-4-4 \quad -2x+5$

$$\frac{(x-1)^2}{4} = (\sqrt{2x-5})^2$$

$$\frac{2x-2}{4} = \frac{4\sqrt{2x-5}}{4}$$

$$4 \left(\frac{x^2 - 2x + 1}{4} \right) = (2x-5)4$$

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

$$x^2 - 2x + 1 = 8x - 20$$

$$-8x + 20 \quad -8x + 20$$

$$x^2 - 10x + 21 = 0$$

$$(x-3)(x-7) = 0$$

$$x=3, 7$$

$$\begin{array}{r} 21 \\ \times -7 \\ \hline -10 \end{array}$$

CHECK 3: ✓

$$\sqrt{4(3)-3} = 2 + \sqrt{2(3)-5}$$

CHECK 7: ✓

$$\sqrt{4(7)-3} = 2 + \sqrt{2(7)-5}$$

$$\sqrt{25} = 2 + \sqrt{9}$$

$$5 = 2+3$$

✓

$$\sqrt{9} = 2 + \sqrt{1}$$

$$3 = 2 + 1$$

Today's Objectives:

Review for the Quarter 1 Final

1. $(4x^3 + 5x^2 - 4x - 10) - (8x^3 - 6x^2 + 4x - 8)$

$$\begin{array}{r} \underline{4x^3} + \underline{5x^2} - \underline{4x} - \underline{10} \quad - \quad \underline{8x^3} + \underline{6x^2} - \underline{4x} + \underline{8} \\ \hline \end{array}$$

$$\boxed{-4x^3 + 11x^2 - 8x - 2}$$

$$2. \quad \underline{4x^3} + \underline{5x^2} - \cancel{4x} - \underline{10} + (\underline{8x^3} - \underline{6x^2} + \cancel{4x} - \underline{8})$$

$$\underline{12x^3 - x^2 - 18}$$

$$3. \quad (2x^2 - 3x - 4)(x^2 - 2x + 5)$$

	$x^2 - 2x + 5$		
$2x^2$	$\underline{2x^4}$	$\underline{-4x^3}$	$\underline{10x^2}$
$-3x$	$\underline{-3x^3}$	$\underline{6x^2}$	$\underline{-15x}$
-4	$\underline{-4x^2}$	$\underline{8x}$	$\underline{-20}$

$$\underline{2x^4 - 7x^3 + 12x^2 - 7x - 20}$$

$$4. x^2 - 17x + 66 = 0$$

$$(x-6)(x-11) = 0$$

$$x = 6, 11$$

$$\begin{array}{r} 66 \\ -11 \quad -6 \\ \hline -17 \end{array}$$

$$5. 2x^2 = -15x + 24$$

$$+15x + 15x - 24$$

$$-24$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-15 \pm \sqrt{417}}{4}$$

$$2x^2 + 15x - 24 = 0$$

$$ax^2 + bx + c = 0$$

$$x = \frac{-(15) \pm \sqrt{(15)^2 - 4(2)(-24)}}{2(2)}$$

Solve:

$$5x^2 = -7x - 13$$

$$+7x \quad +7x \quad +13$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$ax^2 + bx + c = 0$$

$$5x^2 + 7x + 13 = 0$$

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(5)(13)}}{2(5)} = \frac{-7 \pm \sqrt{-211}}{10}$$

$$x = \frac{-7 \pm i\sqrt{211}}{10}$$

6. Which of the following is a factor of (mark all that apply):

$$x^4 + 2x^3 - 13x^2 - 14x + 24$$

$x = -4$	$x = 4$	$x = -3$	$x = 3$
<input checked="" type="checkbox"/> a. $x + 4$	<input checked="" type="checkbox"/> $x - 4$	<input checked="" type="checkbox"/> $x + 3$	<input checked="" type="checkbox"/> d. $x - 3$
<input checked="" type="checkbox"/> e. $x + 2$	<input checked="" type="checkbox"/> $x - 2$	<input checked="" type="checkbox"/> $x + 1$	<input checked="" type="checkbox"/> h. $x - 1$
$x = -2$	$x = 2$	$x = -1$	$x = 1$

$$(-4)^4 + 2(-4)^3 - 13(-4)^2 - 14(-4) + 24 = 0$$

7. Expand using the binomial theorem. $(3x - 2)^4$

$$\begin{aligned}
 & 1(3x)^4(-2)^0 + 4(3x)^3(-2)^1 \\
 & + 6(3x)^2(-2)^2 + 4(3x)^1(-2)^3 + 1(3x)^0(-2)^4 \\
 & \boxed{81x^4 - 216x^3 + 216x^2 - 96x + 16}
 \end{aligned}$$

\rightarrow

		1	1	1		
		1	2	1		
	1	3	3	1		
	1	4	6	4	1	

8. For the function to the right identify the following.

Intercepts (x and y): $(0, 7)$
 $x: (-6, 0), (-2, 0), (2, 0), (8, 0)$

Maximum:
 $(0, 7)$

Minimum:
 $(-4, -5), (5, -4)$

Interval of increasing:
 $(-4, 0) \cup (5, \infty)$

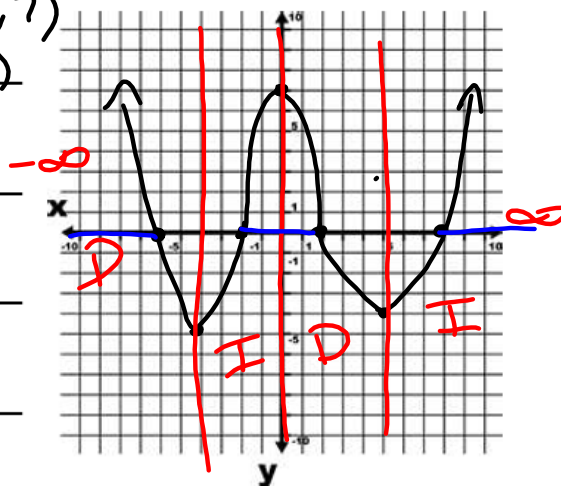
Interval of decreasing:
 $(-\infty, -4) \cup (0, 5)$

Interval of positive: $(-\infty, -6) \cup (-2, 2) \cup (8, \infty)$

Interval of negative: $(-6, -2) \cup (2, 8)$

End behavior:

$x \rightarrow -\infty \quad y \rightarrow \infty \quad x \rightarrow \infty \quad y \rightarrow \infty$



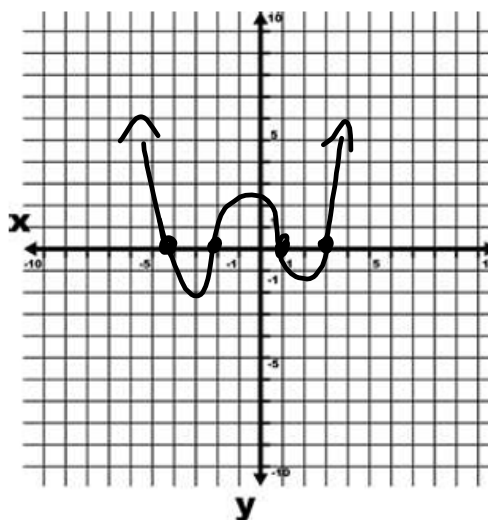
9. State the zeros and end behavior then sketch a graph of the following polynomial

$$f(x) = x^4 + 2x^3 - 13x^2 - 14x + 24$$

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

$$x = 3, 1, -4, -2$$

4 even +
 ↗ ↘

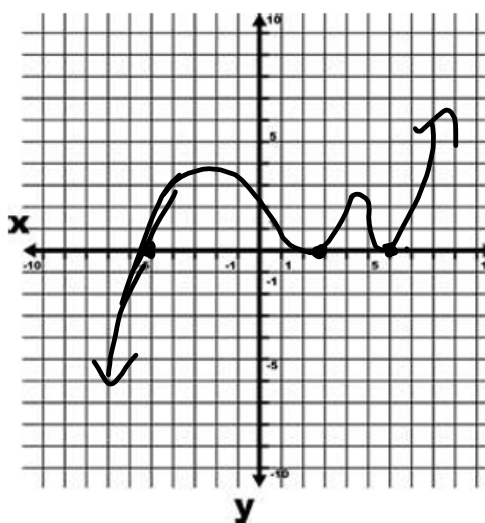


10. State the zeros, multiplicity, if it touches or crosses, and end behavior then sketch a graph of the following polynomial

$$f(x) = (x-3)^4(x-6)^2(x+5)^3$$

Z	M	T/C
3	4 e	T
6	2 e	T
-5	3 o	C

E.B. deg: 9 odd +
 ↘ ↗



11. How many complex roots will the following function have?

$$f(x) = -3x^7 + 8x^5 - 2x^3 + 15x$$

7 zeros/x-int/roots

12. Solve the equation for the variable and check for extraneous solutions.

$$\sqrt{12-x} = x^2$$

$$12-x = x^2 + x - 12$$

-12 -1x

CHECK 3: $\sqrt{12-3} = 3$
 $\sqrt{9} = 3$

CHECK -4: $\sqrt{12-(-4)} = -4$
 $\sqrt{16} = 4 \neq -4$

$$0 = x^2 + x - 12$$

$$0 = (x-3)(x+4)$$

$x = 3, -4$

13. Solve the equation for the variable and check for extraneous solutions.

$$\sqrt{11x - 28} = x$$

$$11x - 28 = x^2 + 28 - 11x$$

$$-11x + 28$$

$$0 = x^2 - 11x + 28$$

$$0 = (x-7)(x-4)$$

$$x = 7, 4$$

CHECK 4:

$$\sqrt{11(4) - 28} = 4$$

$$\sqrt{16} = 4$$

$$\begin{array}{r} 28 \\ -7 \quad -4 \\ \hline -11 \end{array}$$

CHECK 7: $\sqrt{11(7) - 28} = 7$

$$\sqrt{49} = 7$$

14. Find the average rate of change over the interval $[-4, 2]$ for the function

$$f(x) = 3|x - 3| - 2$$

$$\frac{1 - 19}{2 - (-4)} = \frac{-18}{6} = \frac{y_2 - y_1}{x_2 - x_1} = -3$$

$$f(-4) = 3|-4 - 3| - 2$$

$$3|-7| - 2$$

$$3(7) - 2 =$$

$$21 - 2 = 19$$

$$f(2) = 3|2 - 3| - 2$$

$$3|-1| - 2$$

$$3(1) - 2 = 1$$

15. Find the average rate of change over the interval $[-1, 3]$ for the function

$$g(x) = -2\sqrt{x+1} + 4$$

$$\frac{0 - 4}{3 - (-1)} = \frac{-4}{4} = -1$$

$$\frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{4 - 0}{-1 - 3} = \frac{4}{-4}$$

$$= -1$$

$$g(3) = -2\sqrt{3+1} + 4 = 0$$

$$g(-1) = -2\sqrt{-1+1} + 4 = 4$$