2018 Unit 5 Review Sheet   *Key*

Topics:

- Operations with Polynomials
    - Be careful when you subtract polynomials, you subtract the ENTIRE polynomial!

1. Given $f(x) = 2x^2 - 5$ and $h(x) = 5 - x$

- Find $f(x) + h(x)$ in simplest form.

$$(2x^2 - 5) + (5 - x) = 2x^2 \quad\quad - 5$$
$$\underline{\quad\quad\quad\quad\quad -x + 5}$$
$$\boxed{2x^2 - x}$$

- Find $f(x) \cdot h(x)$ in simplest form.

$$(2x^2 - 5)(5 - x) =$$
$$10x^2 - 2x^3 - 25 + 5x$$
$$\boxed{-2x^3 + 10x^2 + 5x - 25}$$

	5	$-x$
$2x^2$	$10x^2$	$-2x^3$
-5	-25	$+5x$

- Find $f(x) - h(x)$ in simplest form.

$$(2x^2 - 5) - (5 - x) = 2x^2 \quad\quad -5$$
$$\underline{\quad\quad\quad\quad\quad +x - 5}$$
$$\boxed{2x^2 + x - 10}$$

- Inverse Functions

2. Given $f(x) = -3x + 1$. Find **the inverse** function.

$$y = -3x + 1$$
$$x = -3y + 1$$
$$x - 1 = -3y$$
$$\boxed{-\tfrac{1}{3}x + \tfrac{1}{3} = f^{-1}(x)}$$ OR $$\boxed{f^{-1}(x) = \frac{x-1}{-3}}$$

- Radical Equations
    - Be sure to CHECK your solutions! Are any of them extraneous solutions?

3. Solve for x: $2 + \sqrt{3x + 4} = x$

$$\frac{-2 \qquad\qquad -2}{(\sqrt{3x+4})^2 = (x-2)^2}$$

$$3x + 4 = x^2 - 4x + 4$$
$$\underline{-3x - 4 \qquad\qquad -3x - 4}$$
$$0 = x^2 - 7x$$

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

$x = 0$	$x - 7 = 0$
	$x = 7$

Check:
$$2 + \sqrt{4} \overset{?}{=} 0 \quad \text{NO}$$
$$2 + \sqrt{25} \overset{?}{=} 7 \quad \text{YES}$$

$$\boxed{\{7\}}$$

- Rational Equations
    - Find a common denominator and then solve the numerator equation.

4. Solve for x: $\frac{1}{x} + \frac{2}{x+2} = \frac{1}{3x}$

LCD: $3 \cdot x (x+2)$
$$x \neq 0, -2$$

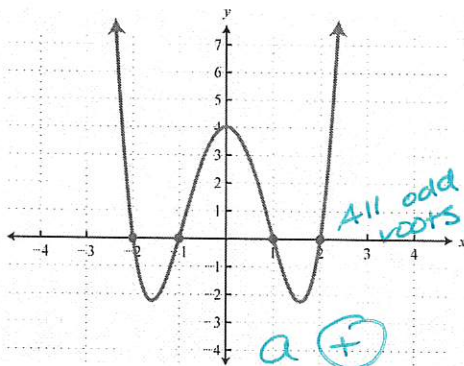$$\frac{1(3)(x+2) + 2(3)(x)}{3x(x+2)} = \frac{1(x+2)}{3x(x+2)}$$

$$3x + 6 + 6x = x + 2$$
$$9x + 6 = x + 2$$
$$8x = -4 \longrightarrow \boxed{x = -\frac{1}{2}}$$

- Writing HOP Functions
    - Be sure to determine the sign of "a"
    - Even or Odd Roots

5. Given the graph shown, write a possible equation for the function in standard form.

All odd roots
a ⊕

ROOTS: $x = -2, -1, 1, 2$

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

EQUATION:

$$y = (x+2)(x+1)(x-1)(x-2)$$
$$y = (x^2 - 4)(x^2 - 1)$$
$$\boxed{y = x^4 - 5x^2 + 4}$$

- Operations & Simplifying Powers of i
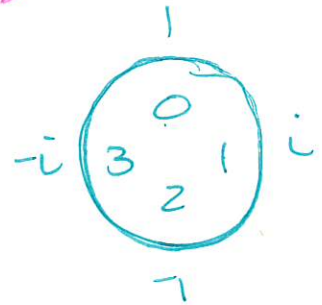 - What can you type into your calculator???

6. Simplify $(3xi^2)^5$

$$(3xi^2)(3xi^2)(3xi^2)(3xi^2)(3xi^2)$$

$$243x^5 \boxed{i^{10}}$$

$$\boxed{i^{10} = -1}$$

$$243x^5(-1)$$

$$\boxed{-243x^5}$$

- Average Rate of Change
  - Same as the slope formula

7. Given $g(x) = 2x^2 - x + 8$, find the average rate of change on the interval $[-2, 3]$.

$$g(-2) = 18$$
$$g(3) = 23$$

$$AROC = \frac{\Delta y}{\Delta x} = \frac{18-23}{-2-3} = \frac{-5}{-5} = 1$$

$$\boxed{AROC = 1}$$

- Determining Factors
  - 3 ways to do this: Synthetic Division, Long Division, Check the root

8. Determine if $x + 4$ is a solution to $g(x) = x^4 + 2x^2 - 5x + 3$. Justify your answer.

$$-4 \begin{array}{|ccccc} 1 & 0 & 2 & -5 & 3 \\ & -4 & 16 & -72 & +308 \\ \hline 1 & -4 & 18 & -77 & \boxed{311} \end{array}$$

NO $(x+4)$ is not a factor

$$g(-4) = (-4)^4 + 2(-4)^2 - 5(-4) + 3 = 311$$

NO. $(x+4)$ is not a factor

- Even and Odd Functions
    - Sub in $f(-x)$...EXACT same thing, EVEN; OPPOSITE function, ODD

1. Classify the **symmetry** of each of the following as **even, odd, or neither**. Explain your answer.

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

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

$$f(x) \neq f(-x)$$
$$f(-x) \neq -f(x)$$

Neither!

B. $h(x) = 2x^3 + 3x - 10$

$$h(-x) = 2(-x)^3 + 3(-x) - 10$$
$$= -2x^3 - 3x - 10$$

Neither!