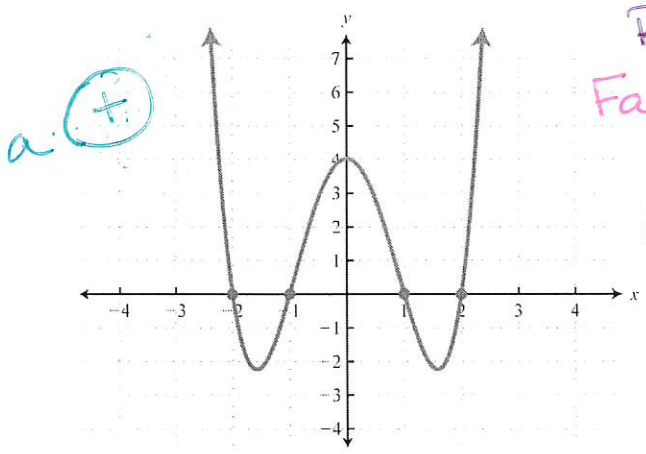# Algebra 2- Unit 5: Relations & Functions Review Sheet

A2 VERB- WRITE

- Polynomial Functions
- Composition of Functions
- Inverse Functions
- Even/ Odd Functions

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

a. (+)

Roots: $x=-2$ $x=-1$ $x=1$ $x=2$

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

$y = (x^2+3x+2)(x^2-3x+2)$

$y = x^4 - 3x^3 + 2x^2$
$\quad + 3x^3 - 9x^2 + 6x$
$\quad\quad + 2x^2 - 6x + 4$

$y = x^4 - 5x^2 + 4$

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

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

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

   Neither
   because $f(-x) \neq f(x) \neq -f(x)$

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

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

   Neither
   because $f(-x) \neq f(x) \neq -f(x)$

3. Given $f(x) = -3x + 1$. Find **the inverse** and use **compositions** to prove your answer.

   $y = -3x + 1$
   $x = -3y + 1$
   $x - 1 = -3y$
   $\dfrac{x-1}{-3} = f^{-1}(x)$

   $f(f^{-1}(x))$
   $f\left(\dfrac{x-1}{-3}\right)$
   $-3\left(\dfrac{x-1}{-3}\right) + 1$
   X

   $f^{-1}(f(x))$
   $f^{-1}(-3x+1)$
   $\dfrac{3x+1}{-3}$
   X

4. Given $f(x) = \frac{x+1}{2}$ and $g(x) = -(3-x)$. $\longrightarrow g(x) = -3+x$

   a. Find $f(g(-1))$.

$$g(-1) = -(3+1) = -4$$
$$f(-4) = \frac{-4+1}{2} = \frac{-3}{2}$$

   b. Find $f^{-1}(x)$ and $g^{-1}(x)$.

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

$$y = -3+x$$
$$x = -3+y$$
$$x+3 = g^{-1}(x)$$

A2 VERB- SOLVE

- Radical Equations
- Quadratic Equations
- Rational Equations

5. Solve for x in simplest radical form: $3x^2 - 72 = 0$.

$$x = \frac{0 \pm \sqrt{(0)^2 - 4(3)(-72)}}{2(3)}$$

$$x = \frac{0 \pm \sqrt{864}}{6} = \frac{0 \pm 12\sqrt{6}}{6} = \pm 2\sqrt{6}$$

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

$$\underset{-2}{} \qquad \underset{-2}{}$$

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

$$3x+4 = x^2 - 4x + 4$$
$$0 = x^2 - 7x$$
$$0 = x(x-7)$$

$$x=0 \quad | \quad x=7 \qquad \{7\}$$

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

LCD: $3x(x+2)$

$* x \neq 0, -2$

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

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

A2 VERB- SIMPLIFY

- Powers of i
- Square Roots/ Cube Roots
- Polynomials
- Rational Expressions

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

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

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

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

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

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

   $$2x^2 - 5 - (5 - x)$$
   $$2x^2 - 5 - 5 + x$$
   $$2x^2 + x - 10$$

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

$$i^2 = -1$$

$$(-3x)^5 = (-3x)(-3x)(-3x)(-3x)(-3x)$$

$$-243x^5$$

10. Simplify: $\dfrac{5x^3 - 8x^2 + 9x + 12}{x-3}$

$$
\begin{array}{c|cccc}
3 & 5 & -8 & 9 & 12 \\
  & \downarrow & 15 & 21 & 90 \\
\hline
  & 5 & 7 & 30 & 102
\end{array}
$$

$$5x^3 - 8x^2 + 9x + 12 = (5x^2 + 7x + 30) + \dfrac{102}{x-3}$$