

Solve the quadratic function utilizing the most efficient method ONCE.

[Factoring, Completing the Square, Square Roots, Quadratic Formula]

1.)  $2x^2 + 5x + 8 = 0$

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

$$x = \frac{-5 \pm \sqrt{5^2 - 4(2)(8)}}{2(2)}$$

$$x = \frac{-5 \pm \sqrt{25 - 64}}{4} = \frac{-5 \pm \sqrt{-39}}{4}$$

$$x = \frac{-5 \pm i\sqrt{39}}{4}$$

2.)  $x^2 + 2x + 5 = 0$

$$x^2 + 2x + \underline{1} = -5 + \underline{1}$$

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

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

$$x+1 = \pm\sqrt{-4}$$

$$x = -1 \pm 2i$$

3.)  $\frac{4x^2}{4} = \frac{-48}{4}$

$$x^2 = -12$$

$$x = \pm\sqrt{-12}$$

$$x = \pm\sqrt{-4 \cdot 3}$$

$$x = \pm 2i\sqrt{3}$$

4.)  $2x^2 + 5x + 2 = 0$

$$(2x+1)(x+2) = 0$$

$$2x+1 = 0$$

$$x+2 = 0$$

$$x = -\frac{1}{2}$$

$$x = -2$$

5.) Express in simplest  $a+bi$  form.  $(x+3i)^2$

$$(x+3i)(x+3i)$$

$$x^2 + 3xi + 3xi + 9i^2$$

$$x^2 + 6xi + 9i^2$$

$$x^2 + 6xi - 9$$

6.) Given the function  $f(x) = x^3 - 2$ , find  $f^{-1}(x)$ .

Original

$$y = x^3 - 2$$

inverse

$$x = y^3 - 2$$
$$\sqrt[3]{x+2} = \sqrt[3]{y^3}$$

$$y = \sqrt[3]{x+2}$$

7.) Solve algebraically for  $x$ :  $\sqrt{3x+16} = (x+2)^2$

$$3x+16 = (x+2)(x+2)$$

$$3x+16 = x^2 + 2x + 2x + 4$$

$$3x+16 = x^2 + 4x + 4$$

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

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

$$x \neq -4 \quad \boxed{x=3}$$

check

$$\sqrt{3(-4)+16} = -4+2$$

$$\sqrt{4} = -2$$

$$2 \neq -2$$

$$\sqrt{3(3)+16} = 3+2$$

$$\sqrt{25} = 5$$

$$5 = 5 \quad \checkmark$$