

## Solving Equations with Logarithms

Example 1: Solve for  $x$ :  $\log_3(x + 2) = 4$ .

$$\log_3(x + 2) = 4$$

$$x + 2 = 3^4 \quad \text{Change to exponential form.}$$

$$x + 2 = 81$$

$$x = 79$$

Example 2: Solve for  $x$ :

$$\text{a) } x^2 - 3x + 2 = 0$$

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

$$x = 1, 2$$

$$\text{b) } (3^x)^2 - 3(3^x) + 2 = 0$$

This is more or less the same equation as (a), but with  $3^x$  instead of  $x$ . To make it clearer, we'll substitute another variable. Let  $a = 3^x$ .

$$a^2 - 3a + 2 = 0$$

$$(a - 1)(a - 2) = 0$$

$$a = 1, 2$$

So  $3^x = 1$  or  $3^x = 2$ . So  $x = 0$  or  $x = 0.63$ .

Practice: pg. 70 # 11, pg. 79 #15