

Math 121 – Section 5.3 Solutions

59. Solve $2^{-x} = 16$.

$$2^{-x} = 16$$

$$2^{-x} = 2^4$$

$$-x = 4$$

$$\boxed{x = -4}$$

60. Solve $3^{-x} = 81$.

$$3^{-x} = 81$$

$$3^{-x} = 3^4$$

$$-x = 4$$

$$\boxed{x = -4}$$

62. Solve $\left(\frac{1}{4}\right)^x = \frac{1}{64}$.

$$\left(\frac{1}{4}\right)^x = \frac{1}{64}$$

$$\left(\frac{1}{4}\right)^x = \left(\frac{1}{4}\right)^3$$

$$\boxed{x = 3}$$

66. Solve $4^{x^2} = 2^x$.

$$4^{x^2} = 2^x$$

$$(2^2)^{x^2} = 2^x$$

$$2^{2x^2} = 2^x$$

$$2x^2 = x$$

$$2x^2 - x = 0$$

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

$$\boxed{x = 0, x = \frac{1}{2}}$$

71. Solve $4^x \cdot 2^{x^2} = 16^2$.

$$\begin{aligned}4^x \cdot 2^{x^2} &= 16^2 \\(2^2)^x \cdot 2^{x^2} &= (2^4)^2 \\2^{2x} \cdot 2^{x^2} &= 2^8 \\x^{2x+x^2} &= 2^8 \\2x + x^2 &= 8 \\x^2 + 2x - 8 &= 0 \\(x + 4)(x - 2) &= 0 \\x = -4, x = 2\end{aligned}$$

77. Suppose that $f(x) = 2^x$.

(a) $f(4) = 2^4 = 16$. The point on the graph of f is $(4, 16)$.

(b) If $f(x) = \frac{1}{16}$ then $x = -4$. The point on the graph of f is $\left(-4, \frac{1}{16}\right)$.

83. If $4^x = 7$ then

$$\begin{aligned}4^x &= 7 \\(4^x)^{-2} &= (7)^{-2} \\4^{-2x} &= \frac{1}{49}\end{aligned}$$