Work Sheet Logarithms and Exponents

Technical Mathematics for Food Technology, MATH 1441

Solve the following equations,

$$4^{1-2x} = 2 \tag{1}$$

$$8^{6+3x} = 4 \tag{2}$$

$$3^{x^2+x} = \sqrt{3} \tag{3}$$

$$4^{x-x^2} = \frac{1}{2} \tag{4}$$

$$\log_x 64 = -3 \tag{5}$$

$$\log_{\sqrt{2}} x = -6 \tag{6}$$

$$5^x = 3^{x+2} \tag{7}$$

$$5^{x+2} = 7^{x-2} \tag{8}$$

$$9^{2x} = 27^{3x-4} \tag{9}$$

$$25^{2x} = 5^{x^2-12} \tag{10}$$

$$\log_3 \sqrt{x-2} = 2 \tag{11}$$

$$2^{x+1} \cdot 8^{-x} = 4 \tag{12}$$

$$8 = 4^{x^2} \cdot 2^{5x} \tag{13}$$

$$2^x \cdot 5 = 10^x \tag{14}$$

$$\log_6(x+3) + \log_6(x+4) = 1 \tag{15}$$

$$\log(7x-12) = 2\log x \tag{16}$$

$$e^{1-x} = 5 \tag{17}$$

$$e^{1-2x} = 4 \tag{18}$$

$$2^{3x} = 3^{2x+1} \tag{19}$$

$$2^{x^3} = 3^{x^2} \tag{20}$$

$$2^{\frac{2}{\log_5 x}} = \frac{1}{16} \tag{21}$$

A small lake is stocked with a certain species of fish. The fish population is modeled by the function

$$P = \frac{10}{1 + 4e^{-0.8t}} \tag{22}$$

where P is the number of fish in thousands and t is measured in years since the lake was stocked.

1. Find the fish population after 3 years.
2. After how many years will the fish population reach 5000 fish?

A culture starts with 8600 bacteria. After one hour the count is $10,000$.

1. Find a function that models the number of bacteria $n(t)$ after t hours.
2. Find the number of bacteria after 2 hours.
3. After how many hours will the number of bacteria double?