Algebra and Calculus: Worksheet 9

Let's solve a ton of exponential and logarithmic equations!

1. $3^{\frac{x}{14}} = 0.01$.
2. $\log(x+3) = \log(x) + \log(3)$
3. $\log(x)^3 = 3\log(x)$
4. $\log_2(x) + \log_2(x-3) = 2$.
5. $\log(x) + \log(x-1) = \log(4x)$.
6. $e^{-5x} = 10$.
7. $6^{x^2-1} = 6^{1-x^2}$
8. $4^x + 2^{1+2x} = 50$.
9. $125^x + 5^{3x+1} = 200$.
10. $\dfrac{50}{1+e^{-x}} = 4$
11. **Section 4.5: 102**

    A learning curve is a graph of a function P(t) that measures the performance of someone learning a skill as a function of the training time t. At first, the rate of learning is rapid. Then, as performance increases and approaches a maximal value M, the rate of learning decreases. It has been found that the function

    $$P(t) = M - Ce^{-kt}$$

    where k and C are positive constants and $C < M$ is a reasonable model for learning.

    (a) Express the learning time t as a function of the performance level P.

    (b) For a pole-vaulter in training, the learning curve is given by

    $$P(t) = 20 - 14e^{-0.024t}$$

    where P(t) is the height he is able to pole-vault after t months. After how many months of training is he able to vault 12 ft?

12. **Section 4.5: 91** - A small lake is stocked with a certain species of fish. The fish population is modeled by the function

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

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

    (a) Find the fish population after three years.

    (b) After how many years will the fish population reach 5000 fish?