

Principles of Calculus Modeling: An Interactive Approach by Donald Kreider, Dwight Lahr, and Susan Diesel
Exercises for Section 1.6

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1. (1 pt)

Simplify the following expression:

$$\ln(e^{1/5}e^{8/7}) = \underline{\hspace{2cm}}$$

Your answer must be a number in decimal or scientific notation, or a fraction.

2. (1 pt)

Simplify the following expression:

$$e^{2\ln\cos(5x)} + (\ln e^{\sin(5x)})^2 = \underline{\hspace{2cm}}$$

Your answer must be a number in decimal or scientific notation, or a fraction.

3. (1 pt)

Simplify the following expression:

$$30\ln\sqrt{e} + 16\ln e^{1/8} = \underline{\hspace{2cm}}$$

Your answer must be a number in decimal or scientific notation, or a fraction.

4. (1 pt)

Solve the following equation for x:

$$3^{x+7} = 8^x$$

$$x = \underline{\hspace{2cm}}$$

5. (1 pt)

Solve the following equation for x:

$$\ln(\ln(5x)) = 0$$

$$x = \underline{\hspace{2cm}}$$

6. (1 pt)

Solve the following equation for x:

$$\ln(x^{1/4}) + \ln(x^{7/4}) = 1$$

$$x = \underline{\hspace{2cm}}$$

7. (1 pt)

Solve the following equation for x:

$$\ln(x+16) = \ln(x) + \ln(16)$$

$$x = \underline{\hspace{2cm}}$$

8. (1 pt)

Simplify the following expression:

$$e^{x-\ln x} + \ln(xe^x) = \underline{\hspace{2cm}}$$

9. (1 pt)

Where does the graph of $e^{-9x} - 10 = y$ cross the x-axis?

$$x = \underline{\hspace{2cm}}$$

10. (1 pt)

Where does the graph of $\ln(x) - \ln(7-x) + 2 = y$ cross the x-axis?

$$x = \underline{\hspace{2cm}}$$

11. (1 pt)

Find all solutions to the equation $2\ln(x) = \ln(75 - 10x)$. Enter the solutions below in increasing order; leave any unused answer boxes blank.

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

12. (1 pt)

Find all solutions to the equation $\ln(x) + \ln(x+6) = 4.71849887129509$. Enter the solutions below in increasing order; leave any unused answer boxes blank.

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}}$$

13. (1 pt)

Consider the function $f(x) = e^{x+6} + 6$. Determine the inverse function and its domain.

$$f^{-1}(x) = \underline{\hspace{2cm}}$$

Domain of f^{-1} : all values of x such that $x >$

$$\underline{\hspace{2cm}}$$

14. (1 pt)

Consider the function $f(x) = 7(5^{x+4}) + 2$. Determine the inverse function and its domain.

$$f^{-1}(x) = \underline{\hspace{2cm}}$$

Domain of f^{-1} : all values of x such that $x >$

$$\underline{\hspace{2cm}}$$

15. (1 pt)

The growth of a sample of bacteria over time is modeled by the equation $y(t) = 2^{0.05t+2}$, with t measured in hours. At what time does the bacteria population reach 124?

$$t = \underline{\hspace{2cm}} \text{ hours}$$

16. (1 pt)

The noise of a rocket engine (as measured in decibels from sea level) is modeled by the equation $y(t) = 16^{1/(3t+0.03)}$, with t measured in minutes. At what time does the noise level drop below 2 decibels?

$$t = \underline{\hspace{2cm}} \text{ minutes}$$