

Directions: No Calculators Allowed. Determine the exact value of any expression that can be obtained without a calculator. For example, $\log_2 8$ can be written as 3. Combine terms using algebraic methods and rules for exponents, where applicable. For example, $2x + 3x$, $5^2 \cdot 5^3$, $\frac{x^5}{x^2}$, and $\ln 3 + \ln 5$ should be rewritten in equivalent forms.

1. $f(x) = \frac{(e^x)^3}{e^2}$. Solve $f(x) = e^5$ for values of x in the domain of f .

$$\frac{(e^x)^3}{e^2} = e^5$$

$$e^{3x} = e^5 \cdot e^2 = e^7$$

$$3x = 7$$

$$x = \frac{7}{3}$$

2. $g(x) = \frac{(e^x)^{1/2}}{e^3}$. Solve $g(x) = e^2$ for values of x in the domain of g .

$$\frac{(e^x)^{1/2}}{e^3} = e^2$$

$$e^{x/2} = e^3 \cdot e^2 = e^5$$

$$\frac{x}{2} = 5$$

$$x = 10$$

3. $h(x) = \frac{(e^x)^2}{e^{1/8}}$. Solve $h(x) = e^{1/4}$ for values of x in the domain of h .

$$\frac{(e^x)^2}{e^{1/8}} = e^{1/4}$$

$$e^{2x} = e^{1/4} \cdot e^{1/8} = e^{3/8}$$

$$2x = \frac{3}{8}$$

$$x = \frac{3}{16}$$

4. $k(x) = \frac{(e^x)^4}{e^{1/3}}$. Solve $k(x) = e^{1/2}$ for values of x in the domain of k .

$$\frac{(e^x)^4}{e^{1/3}} = e^{1/2}$$

$$e^{4x} = e^{1/2} \cdot e^{1/3} = e^{5/6}$$

$$4x = \frac{5}{6}$$

$$x = \frac{5}{24}$$

5. $j(x) = e^{(2x)} - 3e$. Solve $j(x) = 2e$ for values of x in the domain of j .

$$e^{(2x)} - 3e = 2e$$

$$e^{2x} = 5e$$

$$2x = \ln(5e) = 1 + \ln 5$$

$$x = \frac{1 + \ln 5}{2}$$

6. $m(x) = 3e^{(4x)} - 5e$. Solve $m(x) = e$ for values of x in the domain of m .

$$3e^{(4x)} - 5e = e$$

$$3e^{4x} = 6e$$

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

$$4x = \ln(2e) = \ln 2 + 1$$

$$x = \frac{1 + \ln 2}{4}$$

7. $p(x) = 6e^{(4x)} - e$. Solve $p(x) = 2e$ for values of x in the domain of p .

$$6e^{(4x)} - e = 2e$$

$$6e^{4x} = 3e$$

$$e^{4x} = \frac{e}{2}$$

$$4x = \ln(e/2) = 1 - \ln 2$$

$$x = \frac{1 - \ln 2}{4}$$