

# DO NOW

Page 1

## 1.6 Exponential and Logarithmic Functions - Day 2

$$e^0 = 1$$

$$e^1 = e$$

$$e^{-1} = \frac{1}{e}$$

$$\ln 0 = \text{undefined}$$

$$\ln 1 = 0$$

$$\ln e = 1$$

$$\ln e^{-1} = -1$$

Page 2

### Properties of Logarithms

Let  $x, y$  and  $z$  be real #'s  
 $x > 0$  and  $y > 0$

$$1. \ln xy = \ln x + \ln y$$

$$2. \ln \frac{x}{y} = \ln x - \ln y$$

$$3. \ln x^z = z \ln x$$

\*\*Note: The domain of the rewritten logarithm may change.

$$\text{Ex: } f(x) = \ln x^2 \text{ domain: } (-\infty, 0) \cup (0, \infty)$$

$$g(x) = 2 \ln x \text{ domain: } (0, \infty)$$

Page 3

### Solving Equations

\*Remember:

$$e^{\ln x} = x \text{ and } \ln e^x = x$$

Solve to nearest thousandth.

$$\text{Ex: } 1. 7 = e^{x+1}$$

$$\ln 7 = \ln e^{x+1}$$

$$\ln 7 = x + 1$$

$$\ln 7 - 1 = x$$

$$\boxed{0.946 \approx x}$$

$$2. \ln(2x - 3) = 5$$

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

$$2x - 3 = e^5$$

$$2x = e^5 + 3$$

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

$$\boxed{x \approx 75.707}$$

Page 4

pg 55; 60.  $\ln e^{2x-1}$

$$2x - 1$$

64.  $-8 + e^{\ln x^3}$

$$-8 + x^3$$

pg 56; 66.  $\ln 2 \approx 0.6931$

$$\ln 3 \approx 1.0986$$

a.  $\ln 0.25$

$$\ln \frac{1}{4}$$

$$\ln \frac{1}{2^2}$$

$$\ln 2^{-2}$$

$$-2(\ln 2)$$

$$-2(0.6931)$$

$$\boxed{-1.3862}$$

b.  $\ln 24$

$$\ln 2^3 \cdot 3$$

$$\ln 2^3 + \ln 3$$

$$3 \ln 2 + \ln 3$$

$$3(0.6931) + 1.0986$$

$$\boxed{3.1779}$$

66. Continued

$$\ln 2 \approx 0.6931$$

$$\ln 3 \approx 1.0986$$

c.  $\ln \sqrt[3]{12}$

$$\ln (12)^{\frac{1}{3}}$$

$$\ln (2^2 \cdot 3)^{\frac{1}{3}}$$

$$\frac{1}{3} [\ln (2^2 \cdot 3)]$$

$$\frac{1}{3} [\ln 2^2 + \ln 3]$$

$$\frac{1}{3} [2 \ln 2 + \ln 3]$$

$$\frac{1}{3} [2(0.6931) + 1.0986]$$

$$\boxed{0.82826}$$

d.  $\ln \frac{1}{72}$

$$\ln 72^{-1}$$

$$\ln (2^3 \cdot 3^2)^{-1}$$

$$-1 [\ln (2^3 \cdot 3^2)]$$

$$-1 [\ln 2^3 + \ln 3^2]$$

$$-1 [3 \ln 2 + 2 \ln 3]$$

$$-1 [3(0.6931) + 2(1.0986)]$$

$$\boxed{-4.2765}$$

Page 5

Page 6

# **HOMEWORK**

pg 55 - 56; 59 - 65 odd, 71 - 89 odd