Math 12 **Natural Logarithms Worksheet**

1. Use a calculator to find the value of ln x, rounded to the three decimal places, for each value of x.

   (a) 2 (b) 0.3 (c) 12.5

2. Use a calculator to fins the value of e^x, rounded to three decimal places, for each value of x.

   (a) 0.6 (b) 0.055 (c) -0.02

3. Solve each equation giving answers rounded to three decimal places.

   (a) $1500 = 5e^{0.045x}$ (b) $65 = e^{7n}$

   (c) $\ln 3.6 = 0.034t$ (d) $\ln 1.5 = 0.002n$

4. Predict the similarities and the differences that you would expect to see in the graphs of each pair of functions. Using a graphing calculator, check your predictions. Give the coordinates of the point of intersection, if any.

   (a) $y = 2^x, y = e^x$ (b) $y = e^x, y = 2e^x$ (c) y=log x, y=ln x

5. The temperature, *T*, in degrees Celsius, of a cup of coffee t minutes after it is poured is given by $T = 95e^{-0.05t}$.
   (a) How hot was the coffee when it was first poured?
   (b) Find the temperature of the coffee 10 min later.

6. The intensity of light, *I*, passing through a glass with an absorption coefficient of 0.2 is given by $I(t) = I_o e^{-0.2t}$, where I_o is the initial intensity, and *t* is the thickness of the glass in centimeters.
   (a) What thickness will reduce the intensity to half the initial intensity?
   (b) What effect does doubling the thickness of the glass have on the intensity of light passing through it?

1. ln 2 = 0.693 (b) ln 0.3 = -1.204 (c) ln 12.5 = 2.526
2. $e^{0.6}$ =1.822 (b) $e^{0.055}$ =1.057 (c) $e^{-0.02}$ =0.980
3. (a) 126.751 (b) 0.596 (c) 37.675 (d) 202.733
4. (a) (0, 1) (b) vertical expansion by a factor of 2, no intersection points (c) (1, 0)
5. (a) T = 95 Celsius (b) 58 Celsius
6. (a) 3.47 cm (b) $(e^{-0.2})^2$, *e* is smaller therefore, the intensity of light is less