

**NOTE:** These problems are to be done on Engineering paper, using the standard homework format. You may consult with me or with other students on this assignment. Questions about these problems will not be answered during class.

1. Use your graphing calculator to draw the graphs of the functions  $f(x) = \left(\frac{1}{\pi}\right)^x$  and  $g(x) = \log_{1/\pi} x$  in the viewing window:  $[-6, 6] \times [-4, 4]$ . Sketch the graphs on your paper.

**Clearly label each function.**

2. Use the properties of logarithms to write each expression as a single logarithm.

a)  $2 \ln 8 + 5 \ln z$

b)  $\frac{1}{2} \log x - 2(\log y + \log z)$

3. Solve the equation:  $\ln(x - 2) + \ln(2x - 3) = 2 \ln x$

4. A disease spreads through an isolated community. The number of persons infected  $t$  days after the initial infection is approximated by the function  $f(t) = \frac{2000}{1 + 199e^{-0.12t}}$ .

a) How many persons will be infected after one week?

b) Use your graphing calculator to draw the graph of the function  $y = f(t)$ . Sketch the graph on your paper, and give the window dimensions. (Choose dimensions which show that graph begins to level off after awhile.) [*Hint: Think big!*]

5. Given that  $S(x) = \frac{e^x - e^{-x}}{2}$  and  $C(x) = \frac{e^x + e^{-x}}{2}$ .

a) Show **algebraically** that  $C(x)$  is an even function.

b) Show **algebraically** that  $[C(x)]^2 - [S(x)]^2 = 1$ .