Math 1010 - Calculus I
Maple Assignment #2
DUE: Tue Feb 1, in Recitation

To enter the exponential function into MAPLE, use the exp notation, for example:

\[ f := x \rightarrow \exp(x); \]
\[ f := \exp \]

\[ g := x \rightarrow \exp(-2x); \]
\[ g := x \rightarrow e^{-2x} \]

To enter a natural log, use this notation:

\[ h := x \rightarrow \ln(x); \]
\[ h := \ln \]

To take a limit, you can use the limit command, for example if you wanted to take the limit of \(x^2\) as \(x\) goes to infinity, you would type:

\[ j := x \rightarrow x^2; \]
\[ j := x \rightarrow x^2 \]

\[ \lim (j(x), x = \infty); \]
\[ \lim (j(x), x = \infty) = \infty \]

You can plot exponentials and logarithms the same way you plot polynomials, plotting the \(f(x)\) and \(h(x)\) above:

\[ \text{plot} \{ (f(x), h(x)), x = -2..3; \} \]
EXERCISES

1. a) Plot \( f(x) = x^2 \), \( g(x) = \exp(x) \), and \( h(x) = \ln(x) \) on a graph together. By hand, label the functions before you turn in your assignment.
b) What is the limit of \( x^2/\exp(x) \) as \( x \) goes to infinity? Why do you think you got that answer?
c) What is the limit of \( x^2/\ln(x) \) as \( x \) goes to infinity? Why do you think you got that answer?
d) What is the limit of \( \exp(x)/\ln(x) \) as \( x \) goes to infinity? Why do you think you got that answer?

2. For the function \( g(x) \) above, find the equation of the tangent line at \( x=2 \) by following the steps below. (Parts a and b are to be done by hand, part c is done using MAPLE).
a) Find the slopes of the secant lines for the two intervals of \( x \) formed by the points at \( x=1.99, 2.00, \) and \( 2.01 \). Find the slope of the tangent line by taking the average of the two slopes.
b) Substitute this slope into the point-slope form to get the equation of the tangent line.
c) Plot this equation along with \( g(x) \) to show that it is the correct tangent line.