Warm-up Problems - February 16, 2007
Solutions

Trigonometric stuff to remember

\[ \int \sin x \, dx = - \cos x + C \]
\[ \int \cos x \, dx = \sin x + C \]
\[ \tan x = \frac{\sin x}{\cos x} \]
\[ \sec x = \frac{1}{\cos x} \]
\[ \csc x = \frac{1}{\sin x} \]
\[ \cot x = \frac{1}{\tan x} = \frac{\cos x}{\sin x} \]
SOH - CAH - TOA

1. What is “radian-mode” on your calculator? How does your calculator behave differently in radian mode?
   
   Radian mode only affects your calculations of trigonometric functions (see the next problem). It will not change any calculations such as computing something like \( e^\pi \ln 10 \).

2. Which mode was my calculator in when I made these computations? (Figure this out without your calculator!)

   \begin{align*}
   \sin 30 & \approx -0.988 \quad \text{Radian Mode} \\
   \sin 0 & = 0 \quad \text{Radian or Degree Mode} \\
   \sin 1 & \approx 0.84 \quad \text{Radian Mode} \\
   \sin 200 & \approx -0.34 \quad \text{Degree Mode} \\
   \cos(-100) & \approx -0.174 \quad \text{Degree Mode} \\
   \cos(652) & \approx 0.119 \quad \text{Radian} \\
   \frac{e^\pi}{6} & \approx 3.86 \quad \text{Radian or Degree Mode}
   \end{align*}
Lecture Problems

3. Compute the integrals below using both methods discussed in class (make sure you get the same result):

(a) \[
\int_{0}^{1} (2x + 1)^6 \, dx = \frac{1093}{7}
\]

(b) \[
\int_{0}^{1} \frac{x^2}{x^3 + 6} \, dx = \frac{1}{3} \ln \left( \frac{7}{6} \right)
\]

(c) \[
\int_{0}^{\pi/2} x \sin x^2 \, dx = \frac{1}{2}
\]

(d) \[
\int_{0}^{\pi/2} \cos x \cos(\sin x) \, dx = \sin 1
\]