Use Maple to answer the following questions.
Turn in a print out of your Maple work — including the requested graphs.

1. Find the 5th order Taylor polynomial centered at $x_0 = 3$ for $f(x) = \dfrac{\sin(x)}{x}$.
2. Plot $P_5(x)$ (found in problem #1) and $f(x)$ together. Pick a range for your x-coordinates and y-coordinates which looks nice. Of course your window should include $x = x_0 = 3$.
3. Let's find a good approximation of $g(x) = \cos(x)$ on the interval $[-\pi, \pi]$. Let $P_n(x)$ be the n^{th} order MacLaurin polynomial ($x_0 = 0$) for $g(x)$. Find the error bound for $|g(x) - P_n(x)|$ when $-\pi \leq x \leq \pi$.
4. Find the smallest integer n so that the error bound guarantees $|g(x) - P_n(x)| \leq 10^{-6}$ for all $-\pi \leq x \leq \pi$. [*Hint:* You will need to use numerically solve from a point. You may need to try several guesses to get a reasonable answer — negative n's are not reasonable! Also, remember your final n needs to be an integer.]
5. Compute your approximation $P_n(2.5)$ (using the n you found in problem 4) and its actual error $|\cos(2.5) - P_n(2.5)|$ to verify that your approximation really works.
6. Let $h(x) = e^{-x}\sin(x)$. Find the 1st, 3rd, and 6th order Fourier polynomials for $h(x)$.
7. Plot the 3 Fourier polynomials (found in problem #6) together with $h(x)$. You should restrict your plot domain to $-\pi \leq x \leq \pi$.

DUE: Tuesday, November 2nd.