1. Let $f(x) = \sin(x)$, $n = 5$, $c = \pi/2$, and $a = \pi$.
   (a) What is $f(a)$?
   (b) Find the Taylor polynomial of degree n (for the value of n given above) centered at $x = c$ for $f(x)$, call it $p_n(x)$.
   (c) Estimate $f(a)$ by computing $p_n(a)$.
   (d) What is the error in your estimation? (Hint: just do a simple subtraction.)
   (e) Use Taylor's Theorem to compute the bound on the error of $p_n(a)$.
   (f) Is the actual error larger or smaller than the estimate based on Taylor's theorem. Is this a stupid question? Explain.
   (g) What value of n is needed to guarantee the error is no more than 0.00001?

2. Repeat the previous question for $f(x) = \ln(x)$, $n = 7$, $c = 3$, and $a = 5$.

3. Repeat the previous question for $f(x) = e^{-x}$, $n = 6$, $c = 1$, and $a = 3$.

4. Write out the first 6 terms of the Taylor Polynomial for the following functions at the given point. (That is, find $p_5(x)$.)
   (a) $f(x) = e^x$ about $x = 1$
   (b) $f(x) = \sqrt{x+1}$ about $x = 0$
   (c) $f(x) = \sin(x)$ about $x = 0$
   (d) $f(x) = \frac{1}{1+x}$ about $x = 0$
   (e) $f(x) = \ln(x)$ about $x = 2$
   (f) $f(x) = e^{5x^4}$ about $x = 0$ (Hint: be clever on this one! That is, use a formula and don't compute any derivatives.)
   (g) $f(x) = \ln(x+1)$ about $x = 0$