TAYLOR REMAINDER SUPPLEMENTARY PROBLEMS
MATH 202

1-4 In each of the situations listed below, do the following.

a. Find the n^{th} Taylor polynomial $p_n(x)$ of $f(x)$ at the given $x = x_0$.

b. Use the result of part a. to approximate $f(b)$ for the given b.

c. Use the Remainder Estimation Theorem to find an upper bound on the magnitude of the remainder $R_n(b)$

d. Use the results of parts b. and c. to find an interval in which $f(b)$ must lie.

e. Confirm your result in part d. by computing $f(b)$ using your favorite calculating device.

1. $f(x) = \sqrt{x}$, $n = 2$, $x_0 = 1$, $b = 1.1$
2. $f(x) = 1/x$, $n = 2$, $x_0 = 2$, $b = 2.05$
3. $f(x) = e^{-x}$, $n = 3$, $x_0 = 0$, $b = 1/2$
4. $f(x) = \cos x$, $n = 5$, $x_0 = 0$, $b = 0.3$

5-8 In each of the situations listed below, determine the degree of the Maclaurin polynomial required for the error in the approximation of the function $f(x)$ at the indicated value of x to be less than 0.001

5. $f(x) = \sin x$, $x = 0.3$
6. $f(x) = \cos x$, $x = 0.1$
7. $f(x) = e^x$, $x = 0.6$
8. $f(x) = e^x$, $x = 0.3$

9-11 In each of the situations listed below, determine the values of x for which the function $f(x)$ can be approximated by the appropriate Maclaurin polynomial with an error of less than 0.001. Confirm by graphing the magnitude of the error $|R_n(x)| = |f(x) - p_n(x)|$.

9. $f(x) = \sin x$, $p_4(x) = x - \dfrac{x^3}{6}$
10. $f(x) = \cos x$, $p_5(x) = 1 - \dfrac{x^2}{2} + \dfrac{x^4}{24}$
11. $f(x) = e^{-2x}$, $p_3(x) = 1 - 2x + 2x^2 - \dfrac{4}{3}x^3$, $x > 0$