Directions: Answer the following questions about Taylor Series. Show all work.

1. Find the 3rd Taylor Polynomial for $\sqrt{4+x}$ centered at a=0.

2. The 2nd order Taylor Polynomial for $f(x) = x^{3/2}$ centered at a = 1 is $P_2(x) = 1 + \frac{3}{2}(x - 1) + \frac{3}{8}(x - 1)^2$. Using Taylor's Inequality (aka Taylor Remainder Estimation Theorem), find the smallest upper bound for the error in using $P_2(x)$ to approximate f(x) over the interval 0.8 < x < 1.2. The estimation formula is $|R_n(x)| \le \frac{M|x-a|^{n+1}}{(n+1)!}$, where M is an upper bound of $|f^{(n+1)}|$ between a and x. You may leave your answer as an unsimplified expression.

3. Find the Taylor Series expansion for $f(x) = \frac{1}{x^2}$ centered at a = 1.

4. Using the common Maclaurin series' (page 808 in text), determine the Maclaurin series' for the following functions.

a)
$$f(x) = x\sin(3x)$$

$$b) f(x) = xe^{-x}$$