1. Use the Information Booklet to write the first four non-zero terms of the Maclaurin series for
a. $\ln x^2$ [Hint: substitute $u = x^2 - 1$ and then develop the series for $\ln(u+1)$.] b. $f(x) = x\sin 4x$

2a. By finding a sufficient number of derivatives, write the first three terms of the Maclaurin series for $\ln\left(1+e^x\right)$.

b. Hence or otherwise, determine the value of $\lim\limits_{x\to 0} \dfrac{2\ln\left(1+e^x\right)-x-\ln 4}{x^2}$

3a. Rewrite $\ln\left(\dfrac{1+x}{1-x}\right)$ without fractions.

b. Hence, find $P_7(x)$, the Maclaurin Polynomial of degree 7 for $f(x) = \ln\left(\dfrac{1+x}{1-x}\right)$.

c. Find the remainder when $P_7(x)$ is used to estimate $\ln 3$

4. Let $P_4(x) = 7 - 3(x-4) + 5(x-4)^2 - 2(x-4)^3 + 6(x-4)^4$ be the Taylor Polynomial of order 4 for the function f at $x = 4$. Assume f has derivatives of all orders for all real numbers.
a. Find $f(4)$ and $f'''(4)$.
b. Write the second order Taylor polynomial for f' at $x = 4$ and use it to approximate $f'(4.3)$.
c. Write the fourth order Taylor polynomial for $g(x) = \int_4^x f(t)\,dt$ at $x = 4$.

5. Write the indicated series in sigma notation.
a. The Maclaurin series for $\dfrac{1}{1-6x}$. b. The Taylor series for $\dfrac{1}{1-6x}$ centered at $x = 2$.
c. The Maclaurin series for $\cos 3x$. d. The Maclaurin series for $\arctan\dfrac{x}{2}$

6. Find the radius of convergence and interval of convergence for each power series.
a. $\sum\limits_{n=0}^{\infty}\left(\dfrac{2}{3}\right)^n (x-1)^n$ b. $\sum\limits_{n=0}^{\infty}(n+1)x^{3n}$ c. $\sum\limits_{n=0}^{\infty}\dfrac{e^n}{n^e}x^n$ d. $\sum\limits_{n=0}^{\infty}\dfrac{n!}{2^n}x^{2n}$ e. $\sum\limits_{n=0}^{\infty}\dfrac{(10x)^n}{\ln n}$ f. $\sum\limits_{n=0}^{\infty}\left(\dfrac{x^2-1}{2}\right)^n$

5. Ch 9 Review p. 692 (81, 83, 88, 89)