1. **Based on the definition of a Mclaurin polynomial**, show how to find the fourth degree Mclaurin polynomial $p_4(x)$ for $f(x) = e^{3x}$.

2. **Based on the definition of a Taylor polynomial**, show how to find the fourth degree Taylor polynomial $p_3(x)$ for $f(x) = \sin x$, centered at $c = \frac{3\pi}{2}$.

3. (a) Use substitution to find the Mclaurin series for $f(x) = 5e^{-2x}$. Give your answer in summation form, with $x^n$ separated from its coefficient.
   (b) Find the error bound when using the third degree Mclaurin polynomial to approximate $f(\frac{1}{2})$. Give your answer as a decimal rounded to four places past the decimal, and **show clearly how you obtain it**.
   (c) Find the actual error to four places past the decimal, assuming that the value your calculator gives you is "exact."

4. Determine the interval of convergence for each of the following series. **Just give an open interval - do not test the endpoints.**

   (a) $\displaystyle\sum_{n=1}^{\infty} \frac{n^2}{2^n} x^n$ (b) $\displaystyle\sum_{n=1}^{\infty} \frac{n}{3^n}(x+2)^n$ (c) $\displaystyle\sum_{n=1}^{\infty} \frac{(-2)^n}{n!}(x-3)^n$

5. Use algebra to determine the Mclaurin series for $f(x) = \dfrac{5}{3x+4}$. Give the interval of convergence.

6. Use algebra to determine the Taylor series for $g(x) = \dfrac{3}{5-x}$ centered at $c = 1$. Give the interval of convergence.

7. Consider the series $4 - \frac{8}{3}(x+2) + \frac{16}{9}(x+2)^2 - \frac{32}{27}(x+2)^3 - \cdots$.

   (a) Give the series in summation form, and tell where the series is centered.
   (b) Find the function $h(x) = \dfrac{a}{bx+c}$, where $a$, $b$ and $c$ are integers, that the series represents. Give the interval on which the series converges to the function.

8. Find the series solution to $y' - 2y = 0$. Get as many terms as you need to in order to be able to give your answer in summation form.

9. Find the series solution to $y'' - xy = 0$ **up to the seventh degree term as the sum of two parts**, one for each of two unknown constants. **DO NOT** try to find a summation formula - I don't think one exists.

10. The series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}(x-3)^n$ converges on the interval $(2, 4)$. Determine whether the series converges at each endpoint.

11. Show clearly how to approximate $\displaystyle\int_0^1 e^{2x}\,dx$ using the first four terms of a power series. Give your answer to four places past the decimal.