REVIEW FOR MATH 106 FINAL EXAM (2007)

1) Determine whether the sequences given below are convergent or divergent.

a) $\{\ln(1+\frac{1}{n})^n\}$ *b)* $\{\frac{\arctan n}{\sqrt{n}}\}$ *c)* $\{\frac{2n!}{(n!)^2}\}$ *d)* $\{n-\sqrt{n^2-n}\}$

2) Determine whether the series given below are convergent or divergent. Find the sum if convergent.

a) $\Sigma_{n=1}^{\infty}\ \frac{2^n+3^n}{5^n}$ *b)* $\Sigma_{n=1}^{\infty}\ 2^{4-3n}.3^{2n-1}$ *c)* $\Sigma_{n=1}^{\infty}\ \frac{5^{\frac{n}{2}}}{3^{n+2}}$

3) Which of the series below converge absolutely, which converge conditionally, and which diverge?

a) $\Sigma_{n=1}^{\infty}\ \frac{n!}{n^n}$ *b)* $\Sigma_{n=2}^{\infty}\ \frac{\ln n}{n^3}$ *c)* $\Sigma_{n=3}^{\infty}\ \frac{\ln n}{\ln(\ln n)}$ *d)* $\Sigma_{n=4}^{\infty}\ \frac{(-1)^n(n^2+1)}{2n^2+n-1}$

e) $\Sigma_{n=5}^{\infty}\ \frac{1}{n\sqrt{n^2-1}}$ *f)* $\Sigma_{n=6}^{\infty}\ (1-\frac{3}{n})^n$ *g)* $\Sigma_{n=7}^{\infty}\ (\frac{1}{n}-\frac{1}{n^2})$ *h)* $\Sigma_{n=8}^{\infty}\ \frac{3^n}{n^3 2^n}$

i) $\Sigma_{n=5}^{\infty}\ \frac{1}{(\ln n)^2}$ *j)* $\Sigma_{n=3}^{\infty}\ \frac{(-1)^n}{\ln n}$ *k)* $\Sigma_{n=1}^{\infty}\ \frac{(2n!)(n!)}{3n!}$ *l)* $\Sigma_{n=2}^{\infty}\ \frac{1}{n\sqrt{n-1}}$

4) Find the radius and the interval of convergence for the power series given below:

a) $\Sigma_{n=2}^{\infty}\frac{(x-3)^{n+2}}{\pi e^n}$ *b)* $\Sigma_{n=2}^{\infty}\frac{(x-1)^{2n-2}}{(2n-1)!}$ *c)* $\Sigma_{n=1}^{\infty}\frac{x^n}{n^n}$

5) Find the MacLaurin Series of the following functions.

a) e^x *b)* $\sin x$ *c)* $\ln(1+x)$ *d)* $\frac{1}{1-x}$

6) Find the following sums. (Hint: Use Problem 5)

a) $\Sigma_{n=0}^{\infty}\ \frac{(\ln 2)^n}{n!}$ *b)* $\Sigma_{n=0}^{\infty}\ (-1)^n\frac{\pi^{2n+1}}{(2n+1)!}$ *c)* $\Sigma_{n=0}^{\infty}\ \frac{n}{2^n}$