Name:_____

Student Number:_____

Show all your work and give reasons for your answers. Good luck!

Part I

In part I essentially no partial credit is awarded. Hence work these problems carefully. Each problem in part I is 8 points.

(1) Determine if the following series is convergent $\sum_{n=1}^{\infty} \frac{4}{n^3}$

(2) Evaluate $\lim_{n\to\infty} \frac{\cos(5n^2)}{n^2}$

(3) Evaluate $\lim_{n\to\infty} \frac{\ln(n)}{n}$

(4) Find the interval of convergence **and** the sum of the series $\sum_{n=0}^{\infty}(\frac{x}{2})^n$

(5) Find n such that the partial sum S_n approximates $S = \sum_{n=1}^{\infty}\frac{(-1)^n}{n^3}$ with an error less than $(10)^{-7}$.

(6) If $\sum_{n=0}^{\infty} c_n x^n$ is convergent when $x = -2$ and divergent when $x = 5$ is:
(a) $\sum_{n=0}^{\infty} c_n(-8)^n$ convergent?
(b) $\sum_{n=0}^{\infty} c_n$ convergent?

(7) Find the MacLaurin series for the function $f(x) = \frac{5}{3+x}$.

(8) Find the MacLaurin series for the function $f(x) = \sin(x^2)$.

Part II

In part II partial credit is awarded. Also work these problems carefully. Each problem in part II is 13 points.

(9) Find the interval and radius of convergence for the series $\sum_{n=0}^{\infty} \frac{(2x+1)^n}{n}$

(10) Use series to approximate $\int_0^{1/10} e^{-x^2}\,dx$ with an error less than $(10)^{-5}$.

(11) Is the series $\sum_{n=2}^{\infty} \frac{1}{n(\ln(n))^3}$ convergent?

Name:_____

Student Number:_____

Show all your work and give reasons for your answers. Good luck!

Part I

In part I essentially no partial credit is awarded. Hence work these problems carefully. Each problem in part I is 8 points.

(1) Determine if the following series is convergent $\sum_{n=1}^{\infty} \frac{4}{\sqrt{n}}$

(2) Evaluate $\lim_{n\to\infty} \frac{\sin(5n^3)}{n^3}$

(3) Evaluate $\lim_{n\to\infty} \frac{n}{\ln(n)}$

(4) Find the interval of convergence **and** the sum of the series $\sum_{n=0}^{\infty}(\frac{3}{x})^n$

(5) Find n such that the partial sum S_n approximates $S = \sum_{n=1}^{\infty}\frac{(-1)^n}{n^5}$ with an error less than $(10)^{-6}$.

(6) If $\sum_{n=0}^{\infty} c_n x^n$ is convergent when $x = -3$ and divergent when $x = 7$ is:
(a) $\sum_{n=0}^{\infty} c_n(-9)^n$ convergent?
(b) $\sum_{n=0}^{\infty} c_n$ convergent?

(7) Find the MacLaurin series for the function $f(x) = \frac{6}{2+x}$.

(8) Find the MacLaurin series for the function $f(x) = \cos(x^2)$.

Part II

In part II partial credit is awarded. Also work these problems carefully. Each problem in part II is 13 points.

(9) Find the interval and radius of convergence for the series $\sum_{n=0}^{\infty} \frac{(2x-1)^n}{n}$

(10) Use series to approximate $\int_0^{1/10} e^{-x^4}\,dx$ with an error less than $(10)^{-5}$.

(11) Is the series $\sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln(n)}}$ convergent?