Name:_____

Student Number:_____

You MUST show your work and give reasons for your answers!

Good luck.

(1) Find the interval and radius of convergence for the power series

$$\sum_{n=0}^{n=\infty} (-1)^n \frac{x^n}{n\sqrt{n}}$$

(2) Find the power series for the function $f(x) = \ln(x + 1)$ centered at $a = 0$. What is its radius of convergence?

(3) Given that $\sin(x) = \sum_{n=0}^{\infty}(-1)^n \frac{x^{2n+1}}{(2n+1)!}$ find a power series for $\frac{sin(x)}{x}$ and use it to evaluate $\int_0^{1/10} \frac{\sin(x)}{x}$ with an error less than 10^{-6}.

(4) Test the series for convergence:
(a) $\sum_{n=0}^{n=\infty}(-1)^n \frac{n}{n+1}$

(b) $\sum_{n=0}^{n=\infty} \frac{arctan(n)}{n^2+1}$

(5) Find the limit of the sequence $a_n = \frac{\ln(n)}{n}$.

Name:_____

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Good luck.

(1) Find the interval and radius of convergence for the power series

$$\sum_{n=2}^{n=\infty}(-1)^n\frac{x^n}{\ln(n)}$$

(2) Find the power series for the function $f(x) = \arctan(x)$ centered at $a = 0$. What is its radius of convergence?

(3) Given that $\cos(x) = \sum_{n=0}^{\infty}(-1)^n \frac{x^{2n}}{(2n)!}$ find a power series for $x^2\cos(x)$ and use it to evaluate $\int_0^{1/10} x^2\cos(x)\,dx$ with an error less than 10^{-6}.

(4) Test the series for convergence:
(a) $\sum_{n=0}^{n=\infty}(-1)^n \arctan(n)$

(b) $\sum_{n=0}^{n=\infty} \frac{\ln(n)}{n}$

(5) Find the limit of the sequence $a_n = \sqrt{\frac{n^2+5}{3n^2-7}}$.