

Homework 1, Math 308, Spring 2010, due Feb 8th

Before you answer these questions, look at the template answers on the webpage to see how answers should be written.

- (1) Decide whether the limits exist and find them when you can.
 - (a) $\lim_{n \rightarrow \infty} \frac{3n^2 + 4n + 1}{\sqrt{9n^4 + n^3 + n + 1}}$
 - (b) $\lim_{n \rightarrow \infty} \frac{5^n}{n^5}$
 - (c) $\lim_{x \rightarrow 0} \frac{\sin 2x}{x^2}$
- (2) Decide which of the following series are convergent.
 - (a) $\sum_{n=0}^{\infty} \frac{n}{n^3 + 1}$
 - (b) $\sum_{n=0}^{\infty} \frac{\pi^n}{n!}$
 - (c) $\sum_{n=0}^{\infty} (-1)^n \frac{n^2}{n^3 + 1}$
 - (d) $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$
- (3) Decide the interval of convergence for the following series.
 - (a) $\sum_{n=1}^{\infty} \frac{x^n}{(n!)^3}$
 - (b) $\sum_{n=1}^{\infty} \frac{nx^n}{n+1}$
 - (c) $\sum_{n=1}^{\infty} (-1)^n n^2 x^n$
- (4) Find the first few terms (at least four terms) of the Maclaurin series for the following functions.
 - (a) $f(x) = \int_0^x e^{-t^2} dt$
 - (b) $\frac{x}{\sin x}$