

# Math 31B Practice Problems I

Written by Victoria Kala

vtkala@math.ucla.edu

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1. Determine whether the series is convergent or divergent. State what test(s) you used to come to your conclusion.

$$\begin{array}{llll} \text{(a)} \sum_{n=1}^{\infty} \frac{1 + \sin n}{10^n} & \text{(c)} \sum_{n=1}^{\infty} \frac{(-10)^n}{n!} & \text{(e)} \sum_{n=1}^{\infty} \left( \frac{n^2 + 1}{2n^2 + 1} \right)^n & \text{(g)} \sum_{n=2}^{\infty} \frac{1}{n\sqrt{\ln n}} \\ \text{(b)} \sum_{n=1}^{\infty} \frac{(-1)^n n}{10^n} & \text{(d)} \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n \ln n} & \text{(f)} \sum_{n=1}^{\infty} \frac{n}{n^3 + 1} & \text{(h)} \sum_{n=1}^{\infty} \frac{(-1)^n n}{n + 2} \end{array}$$

2. Find the Taylor polynomial  $T_4$  of  $f(x) = \frac{1}{x}$  about  $a = -1$ .

3. Find  $(f^{-1})'(2)$  where  $f(x) = x^3 + 3 \sin x + 2 \cos x$ .

4. Evaluate the following:

$$\begin{array}{lll} \text{(a)} \int \frac{\tan^{-1}(x)}{1+x^2} dx & \text{(c)} \int \frac{1}{\sqrt{5-2x^2}} dx & \text{(e)} \int \frac{1}{x^2-16} dx \\ \text{(b)} \int \frac{1}{4+x^2} dx & \text{(d)} \int \frac{10}{(x-1)(x^2+9)} dx & \text{(f)} \int \frac{1}{(x+5)^2(x-1)} dx \end{array}$$