Math 101 Tutorial Worksheet 7

1. Which of the following series converge, and which diverge?

   (a) $\displaystyle\sum_{n=1}^{\infty} \frac{2^n + 3^n}{3^n + 4^n}$

   (b) $\displaystyle\sum_{n=1}^{\infty} (-1)^n \left(\sqrt{n^2 + n} - n \right)$

   (c) $\displaystyle\sum_{n=1}^{\infty} \frac{\sqrt{n}}{n^2 + 1}$

   (d) $\displaystyle\sum_{n=1}^{\infty} (-1)^n \frac{n^n}{(2^n)^3}$

   (e) $\displaystyle\sum_{n=1}^{\infty} \frac{(-100)^n}{n!}$

   (f) $\displaystyle\sum_{n=1}^{\infty} \left(1 - \frac{1}{3n} \right)^n$

   (g) $\displaystyle\sum_{n=1}^{\infty} \frac{n2^n (n+1)!}{(3^n)\, n!}$

   (h) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{1 + 2^2 + 3^2 + \cdots + n^2}$

2. Do the following series $\displaystyle\sum_{n=1}^{\infty} a_n$ converge or diverge?

   (a) $a_1 = 3, a_{n+1} = \left(\dfrac{n}{n+1} \right) a_n$

   (b) $a_1 = 1, a_{n+1} = \left(\dfrac{1 + \tan^{-1} n}{n} \right) a_n$