CALCULUS III

Exam # 2

(20 points) 1. Does the sequence with the following n^{th} term converge or diverge? Find the limit of each convergent sequence.

a) $a_n = \dfrac{(n+1)\ln n - n\ln(n+1)}{\ln n}$ b) $a_n = \dfrac{1}{\sqrt{n^2+1}-n}$

(10 points) 2. Find the sum (if any) of $\sum_{n=1}^{\infty} \dfrac{n}{(n+1)!}$

(40 points) 3. Does the following series converge or diverge?

a) $\sum_{n=1}^{\infty} \dfrac{(n-1)!\ln n}{(n+1)!\,n}$ b) $\sum_{n=1}^{\infty} \dfrac{\tan^{-1} n}{1+n^2}$ c) $\sum_{n=1}^{\infty} \dfrac{1}{1+e^n}$

d) $\sum_{n=0}^{\infty} \dfrac{n!}{(2n)!}$ e) $\sum_{n=1}^{\infty} (-1)^{n+1} \dfrac{1}{\sqrt{n(n+1)}}$

(30 points) 4. a) Find the series' radius and interval of convergence $\sum_{n=0}^{\infty} \dfrac{(-1)^n x^{2n}}{(n!)^2 2^{2n}}$.

For what values of x does the series converge

b) Absolutely?
c) Conditionally?