Take-Home Quiz

Due 12/17 by Noon
Hand in to your TA

JUSTIFY ANSWERS FOR FULL CREDIT.

1.) Consider the sequences $\{a_n\}_{n=1}^{\infty}$ with a_n defined below. Determine whether the sequences converge or diverge. If convergent, find the limit of the sequence.

i.) $a_n = (1+(-1)^n)\left(\frac{n-1}{n}\right)$

ii.) $a_n = \dfrac{\left(\frac{10}{11}\right)^n}{\left(\frac{9}{10}\right)^n + \left(\frac{11}{12}\right)^n}$

2.) Determine if the following series converge or diverge.

i.) $\displaystyle\sum_{n=3}^{\infty} \frac{1/n}{(\ln n)\sqrt{\ln^2 n - 1}}$

ii.) $\displaystyle\sum_{n=3}^{\infty} \frac{3^{n-1}+1}{3^n}$

iii.) $\displaystyle\sum_{n=1}^{\infty} \frac{\sqrt[n]{n}}{n^3}$

iv.) $\displaystyle\sum_{n=1}^{\infty} \frac{n3^n(n+2)!}{4^n n!}$

3.) Consider the following power series. Find the radius and interval of convergence for each series. In each case, determine the values of x for which the series is absolutely or conditionally convergent.

i.) $$\sum_{n=0}^{\infty} \frac{(-1)^n}{2} \left(\frac{1}{3 + \sin x} \right)^n$$

ii.) $$\sum_{n=0}^{\infty} \frac{(n+2)(2x+1)^n}{(2n+1)\,3^n}$$

4.) Estimate the integral $\int_0^1 \cos\sqrt{t}\, dt$ to within 4 decimal places of accuracy. Determine the order of the Taylor polynomial that will yield the desired accuracy.

EXTRA CREDIT

Express the repeating decimal $1.42\overline{123} = 1.42123123123\ldots$ as a ratio of two integers.