Math 2414 Graded Homework 4 (Section 11.1 - 11.4) Fall 2019

Instructions:

1) **Due: During the first 10 minutes of your problem session the week of Nov. 11, 2019**
2) **Assignments must be submitted in a blue book – no exceptions. Bluebooks are available at the on campus/off campus bookstore, student union, etc.**
3) **On the front cover, write the following at the top:**
   a) **TA name**
   b) **Your name**
   c) **Assignment name**
   d) **Problem session number**
4) **You may use both sides of each page, but start a new problem at the top of a new side.**
5) **Solutions must be presented neatly, completely, and with logical flow.**
6) **15% will be deducted for assignments turned in after the first 10 minutes of class.**
7) **25% will be deducted for assignments which are not neat and orderly.**
8) **15% will be deducted for assignments without your TA's name.**
9) **Assignments will not be accepted after class.**

1. Find a formula for the general term a_n of the sequence, assuming the pattern continues and that the first term corresponds to $n = 1$,

$$\left\{2, -\frac{24}{9}, \frac{120}{27}, -\frac{720}{81}, \ldots\right\}$$

2. Determine whether the sequence converges or diverges. If it converges, find its limit.

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

b) $a_n = \cos(n)\sin\left(\dfrac{1}{n}\right)$

c) $a_n = \tan^{-1}\left(\dfrac{4n^3 + 2n^2 - 1}{6 + n - 3n^2}\right)$

3. Determine whether each series is convergent or divergent. If it is convergent, find its sum.

a) $\displaystyle\sum_{n=1}^{\infty} \tan^{-1}\left(\frac{4n^3 + 2n^2 - 1}{6 + n - 3n^2}\right)$

$b)$ $\displaystyle\sum_{k=1}^{\infty} \frac{2^k + 5(3^{k-1})}{3^{2k}}$

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

4. Find all values of x for which

$$\sum_{n=0}^{\infty} \frac{1}{(1+x)^n} = 4$$

5. Use the Integral Test to determine whether the series converges or diverges.

a) $\frac{3}{4} + \frac{3}{6} + \frac{3}{8} + \frac{3}{10} + \cdots$

b) $\sum_{k=1}^{\infty} \frac{12}{k^2 + 4}$

c) $\sum_{n=1}^{\infty} 2n^5 e^{-n^2}$

6. Consider the series

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

a. Use the Integral Test to show that the series converges.
b. Find the smallest value of n such that $|s - s_n| < 0.0001$. In other words, find the minimum number of terms necessary to calculate the sum with an absolute error less that one ten-thousandth.

7. Determine whether each series converges or diverges.

a) $\sum_{n=2}^{\infty} \frac{5n + 1}{2n^2 - 6n}$

b) $\sum_{k=1}^{\infty} \frac{\sqrt{k^2 + 5}}{k^3 + 6}$

c) $\sum_{n=1}^{\infty} \frac{3^n \sin^2(n)}{n + 5^n}$

d) $\sum_{n=2}^{\infty} \frac{e^n}{n\sqrt{\ln n}}$