MATH 3283W  HOMEWORK #5  DUE 4/6/10
SUMMATION NOTATION, SECTIONS 4.2, 4.3, CHAPTER 4

PART A

1. DETERMINE IF THE FOLLOWING SERIES CONVERGE OR DIVERGE. GIVE REASONS FOR YOUR ANSWERS

(a) \( \sum_{n=1}^{\infty} \frac{5^{3n+2}}{4^{1+4n}} \)
(b) \( \sum_{n=1}^{\infty} \frac{1}{n(n+1)} \)
(c) \( \sum_{m=0}^{\infty} \frac{1}{(m+1)(m+2)} \)
(d) \( \sum_{n=1}^{\infty} n^{-5/6} \)

2. (a) FIND A FORMULA FOR \( \sum_{n=1}^{\infty} \sum_{j=1}^{n} n_j \) IN TERMS OF \( n \). SHOW YOUR WORK

(b) EVALUATE \( \sum_{n=1}^{c} \sum_{j=1}^{c} n_j \)

3. FIND THE SUM OF THE FOLLOWING SERIES. FOR WHAT VALUES OF \( x \) DOES IT CONVERGE?

(a) \( \sum_{n=2}^{\infty} x^{3n} \)
(b) \( \sum_{n=0}^{\infty} (-1)^n x^n \) WHERE \( k \in \mathbb{N} \)

4. (a) WRITE THE FOLLOWING INFINITE DECIMALS AS FRACTIONS

(i) \( \overline{357} \)
(ii) \( 123211232112321 \)

(b) WHAT IS THE VALUE OF THE SUM \( 0.59 + \overline{0.73} \) ?
PART B

5. Suppose \( \sum_{n=1}^{\infty} a_n \) is a series of positive terms which converges. Do the following series converge or diverge? Prove your answers.

(a) \( \sum_{n=1}^{\infty} \sin a_n \)
(b) \( \sum_{n=1}^{\infty} \cos a_n \)

6. Determine if the series converge or diverge. Give careful reasons for your answers.

(a) \( 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \frac{1}{5^2} + \ldots \)
(b) \( 1 + \frac{1}{2^3} + \frac{1}{3^3} + \frac{1}{4^3} + \frac{1}{5^3} + \ldots \)
(c) \( \sum_{n=1}^{\infty} \frac{1}{n(n+y_n)} \)

7. Find the shaded area, show your reasoning/calculations.