

Math 201-Midterm (Summer 10)

B. Shayya

- Please write your section number on your booklet.
- Please answer each problem on the indicated page(s) of the booklet. Any part of your answer not written on the indicated page(s) will not be graded.
- Unjustified answers will receive little or no credit.

~~Problem 1 (answer on page 1 of the booklet.)~~

~~(A) (7 pts each) Which of the following sequences converge, and which diverge? Find the limit of each convergent sequence.~~

~~$\sum_{n=1}^{\infty} \frac{5n^5 - n}{3n^5 + 3n^3} = 5/3$~~   
 ~~$\sum_{n=1}^{\infty} \frac{1 + \sin n}{n + 2} = 0$~~   
 ~~$\sum_{n=1}^{\infty} \frac{(n-3)^n}{(n+1)^n} = e^{-4}$~~

~~(ij) (7 pts) Prove that the sequence  $\{(-1)^n\}$  diverges.~~

~~Problem 2 (answer on pages 2 and 3 of the booklet.)~~

~~(8 pts each) Which of the following series converge, and which diverge? When possible, find the sum of the series.~~

~~(i)  $\sum_{n=1}^{\infty} \left( \frac{3^{n-1}}{5^{n+2}} - \frac{(-1)^n}{2^n} \right)$~~   
~~(ii)  $\sum_{n=3}^{\infty} \frac{1 + 3n^2}{n^8 + 5n^3}$~~   
~~(iii)  $\sum_{n=1}^{\infty} \frac{\sqrt{n-1}}{n^{0.2}}$~~   
~~(iv)  $\sum_{n=1}^{\infty} (-1)^n \frac{n(n+1)}{2} e^{1/n}$~~

~~Problem 3 (answer on page 4 of the booklet.)~~

~~(10 pts) Find the interval of convergence of the power series~~

~~$\sum_{n=1}^{\infty} \frac{(x-5)^n}{n + \ln n}$~~

For what values of  $x$  does the series converge absolutely? Conditionally?

~~Problem 4 (answer on page 5 of the booklet.)~~

~~(10 pts) When  $0 \leq h \leq 0.01$ , show that  $e^h$  may be replaced by  $1 + h$  with an error of magnitude no greater than 0.6% of  $h$ . Use  $e^{0.01} = 1.01$ .~~

~~Problem 5 (answer on page 6 of the booklet.)~~

~~(a) (9 pts) Find the domain and range of the function  $f(x, y) = 3/(4 - x^2 - y^2)$ . Determine if the domain of  $f$  is an open region, a closed region, or neither. Also, decide if the domain is bounded or unbounded.~~

~~Domain is  $= \{(x, y) : x^2 + y^2 \neq 4\}$~~

~~$x^2 + y^2 = 4 - 3/e > 0$  can be solved for  $(x, y)$~~

~~(b) (5 pts) Does~~

~~$\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 \sqrt{y}}{x^2 + y^2} \leq \left| \frac{x^2 \sqrt{y}}{x^2} \right| = \sqrt{y}$~~

exist? Why or why not?

~~$\lim_{(x,y) \rightarrow (0,0)} \sqrt{y} = 0$  by LCT~~

~~(c) (6 pts) What about~~

~~$\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 \sqrt{y}}{x + y}$~~

~~Problem 6 (answer on page 7 of the booklet.)~~

~~(2 pts) Match each of the equations given on the back side of this page with the surface it defines.~~