



## Study Guide 3

## MATH 172 Lab: Sections 7 and 8

Lab Instructor (TA): Mohammed Kaabar

Student's Name:-----

Student's ID:-----

*Note: This study guide contains my practice questions that I think will be useful for preparing you for the third exam in Calculus II.*

**Question 1:** Determine if the series diverges or converges. Be sure to explain which test you use:

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

**Question 2:** Determine if the series diverges or converges. Be sure to explain which test you use:

$$\sum_{n=1}^{\infty} \left(1 + \frac{1}{n}\right)^2 e^{-n}$$

**Question 3:** Determine whether the following series diverges, converges conditionally, or converges absolutely:

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

**Question 4:** Determine whether the following series diverges, converges conditionally, or converges absolutely:

$$\sum_{n=1}^{\infty} (-1)^n (\sqrt{n+1} - \sqrt{n})$$

**Question 5:** Use a comparison test to determine whether the integral converges or diverges:

$$\int_1^{\infty} \frac{1 + \sec^2 x}{x} dx$$

**Question 6:** Find the sum of the following series:

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

**Question 7:** Determine whether the following sequence is increasing or decreasing:

$$a_n = \frac{3^n}{(n+2)!}$$

**Question 8:** Determine whether the following sequence converges or diverges:

$$a_n = \frac{e^n + 2}{e^{2n} - 1}$$

**Question 9:** Show the following sequence is bounded:

$$a_n = \frac{3n^2 - 2}{n^2 + 1}$$

**Question 10:** Use the integral test to determine the convergence or divergence of the following series:

$$\sum_{m=1}^{\infty} \frac{e^{\frac{1}{m}}}{m^2}$$

**Question 11:** Determine whether the series converges or diverges. If convergent, find the sum of the series:

$$\sum_{m=2}^{\infty} \left( \frac{2}{3^m} + \frac{1}{2^m} \right)$$

**Question 12:** Prove that  $0.1\bar{9} = 0.2$ .

**Question 13:** Show that the series  $\sum_{n=1}^{\infty} (-1)^n \frac{n^2}{5^n}$  is convergent. How many terms are needed to approximate the series with the maximum error of  $3(10)^{-2}$ .

**Question 14:** Determine the radius and interval of convergence for the series:

$$\sum_{n=1}^{\infty} \frac{(-1)^n (x-1)^n}{(2n+3)4^n}$$

**Question 15:**

**Part a:** Find a power series representation about  $x = 0$  for  $f(x) = \frac{1}{5+4x}$ . Then find the radius of convergence.

**Part b:** Use part a, to find a power series representation for  $g(x) = -\frac{4}{(5+4x)^2}$ .

**Part c:** Use part b, to find a power series representation for  $h(x) = \ln(5 + 4x)$ .



**Question 16:** How many terms of the Maclaurin series for  $\ln(x + 1)$  do you need to use to estimate  $\ln(1.4)$  within 0.001?

*Good Luck in Exam 3*

*Best of Luck*

*Mohammed K A Kaabar*