

Due Monday, April 29 at start of class

Name: _____

Math 1520 – Quiz 10 – Take Home

This quiz should take you approximately 25 minutes. You may use your book, calculators, software, the internet, and any reference material.

Do not work together and do not get help (except from Dr. Clair).

- (10) 1. Use the ratio test to show that the series $\sum_{n=0}^{\infty} \frac{n^2}{n!}$ converges. Show your work.

- (10) 2. Find the interval of convergence for the power series $\sum_{n=0}^{\infty} \frac{(x-9)^n}{n}$

(10) 3. (a) Find the first four non-zero terms of the Taylor series for $x^2 \sin(x)$ at $x = 0$.

(b) What is the 7th derivative of $x^2 \sin(x)$ at $x = 0$?

(10) 4. The fourth degree Taylor polynomial for $\cos(x)$ is $P_4(x) = 1 - \frac{x^2}{2} + \frac{x^4}{24}$.

(a) Use P_4 to approximate $\cos(0.1)$.

(b) Give a bound on the error of your approximation in part (a) by using the Lagrange error formula.

(10) 5. Let $f(x) = |x|$.

(a) Find the constant term $a_0 = \frac{1}{2\pi} \int_{-\pi}^{\pi} f(x)dx$ of the Fourier series for f .

(b) Since f is an even function $b_n = 0$ for all n . The other coefficients satisfy:

$$a_n = \begin{cases} -\frac{4}{\pi n^2} & \text{when } n \text{ is odd} \\ 0 & \text{when } n \text{ is even} \end{cases}$$

Write the first three nonzero terms of the Fourier series for f .