

Name: _____

4-digit code: _____

- Write your name and the last 4 digits of your SSN in the space provided above.
- The test has five (5) pages, including this one.
- You must show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit.
- Credit for each problem is given in parentheses at the right of the problem number.
- No books, notes or calculators may be used on this test.

Page	Max. points	Your points
2	25	
3	25	
4	20	
5	30	
Total	100	

Problem 1 (10 pts). For what values of x is the following series convergent?

$$\sum_{n=1}^{\infty} \frac{(x - \pi)^n}{n}$$

Problem 2 (15 pts). Find the radius of convergence and interval of convergence of the series

$$\sum_{n=1}^{\infty} \frac{(-\pi)^n x^n}{\sqrt{n}}$$

Problem 3 (10 pts). Assume known that

$$\frac{1}{1-x} = \sum_{n=0}^{\infty} x^n \text{ for } |x| < 1.$$

Express the function $f(x) = 1/(1-x)^2$ as a power series by differentiating the previous equation. What is the radius of convergence?

Problem 4 (15 pts). Find a power series representation for $f(x) = \ln(1-x)$ and its radius of convergence.

Problem 5 (10 pts). Find the Taylor series for $f(x) = e^x$ at $a = \pi$.

Problem 6 (10 pts). Find the Maclaurin series for the function $f(x) = x^2 \sin x$

Problem 7 (15 pts). Find the first three nonzero terms in the Maclaurin series for $f(x) = e^x \cos x$.

Problem 8 (15 pts). Evaluate $\int e^{-x^2} dx$ as an infinite series.