

1. PRACTICE FOR EXAM 3.

1. Determine if the series converges or diverges. State which convergence test you are using.

A. $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{1}{n^2}$,

B. $\sum_{n=1}^{\infty} \frac{n^2}{n!}$

C. $\sum_{n=1}^{\infty} \frac{(n-2)!}{n^2}$

D. $\sum_{n=0}^{\infty} \frac{\sin n}{e^n}$

E. $\sum_{n=1}^{\infty} \frac{n^3 - 1}{n^5 + 2}$

F. $\sum_{n=2}^{\infty} \frac{3}{n(\ln n)^2}$

2. Given the series

$$\sum_{k=1}^{\infty} \frac{(x-3)^k}{k}$$

A. Use the ratio test to find the radius of convergence.

B Find the interval of convergence. (Make sure you check the endpoints of the interval for convergence).

3. Given the series

$$\sum_{k=1}^{\infty} \frac{(2n!)x^n}{n!n^2}$$

A Use the ratio test to find the radius of convergence.

B Find the interval of convergence

4. Find an expression for the general term of the series. Give the starting value of the index.

$$(x-3) + \frac{(x-3)^2}{2 \cdot 2!} + \frac{(x-3)^3}{4 \cdot 3!} + \frac{(x-3)^4}{8 \cdot 4!} + \dots$$

5.

Given the series

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

A Use the ratio test to find the radius of convergence.

B Find the interval of convergence

6.

Exercise 8.7.7

Exercise 8.7.8

Find c , the pdf and cdf in both problems.

7. Exercise 8.8.4 (HGM, Calculus):

The probability of a transistor failing between $t = a$ months and $t = b$ months is given by

$$c \int_a^b e^{-ct} dt,$$

for some constant c .

A. If the probability of failure within the first six months is 10%, what is c ?

B. Given the value of c in part (a), what is the probability the transistor fails within the second six months?

8. Find a formula for s_n , $n \geq 1$.

A. $\frac{1}{3}, -\frac{1}{5}, \frac{1}{7}, -\frac{1}{9}, \frac{1}{11}, \dots$

B. $\frac{13}{5}, \frac{13}{9}, 1, \frac{13}{17}, \frac{13}{21}, \frac{13}{25}, \dots$

9. For each of the following infinite geometric series, determine if the sum exists. If it exists, find the sum.

A. $4 - 2 + 1 - \frac{1}{2} + \frac{1}{4} - \dots$

B. $1 + 3 + 9 + 27 + 81 + \dots$

10. Find the following sums.

A. $\sum_{n=2}^8 2\left(\frac{1}{3}\right)^n$

$$B. \sum_{n=1}^{\infty} 2 \left(\frac{1}{3}\right)^n.$$

11. Exercise 8.8.5 (HGM, Calculus) Suppose that x measures the time (in hours) it takes for a student to complete an exam. All students are done within two hours and the density function for x is

$$p(x) = \begin{cases} \frac{x^3}{4} & \text{if } 0 \leq x \leq 2; \\ 0 & \text{otherwise.} \end{cases}$$

A. What proportion of students take between 1.5 and 2.0 hours to finish the exam?

B. What is the mean time for students to complete the exam?

C. Compute the median of this distribution.

12. Find the following limit $\lim_{n \rightarrow \infty} \frac{3n^2 + 4}{5n^2 - 1}$