

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. The function $f(x)$ is approximated near $x = 3$ by the third degree Taylor polynomial

$$P_3(x) = 5 - 2(x - 3) + 8(x - 3)^2 - 4(x - 3)^3.$$

Determine $f'''(3)$

7.

A. Find the fifth degree Taylor polynomial approximation for $f(x) = \sin(x)$ near 0.

B. Use the the fifth degree Taylor polynomial approximation for $f(x) = \sin(x)$ to find

$$\lim_{x \rightarrow 0} \frac{\sin(x) - x + \frac{x^3}{3!}}{x^5}.$$

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

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