

Second Midterm Practice test 1

1. Does the series

$$\sum_{n=2}^{\infty} \frac{5 \cdot 3^n}{4^{n+1}}$$

converge or diverge? If it converges, find its sum.

2. Find the third degree Taylor formula for $f(x) = \tan x$ at $x = 0$.

3. Does the series

$$\sum_{n=1}^{\infty} \frac{5n + 19}{n^2 + 7n + 10}$$

converge or diverge?

4. Does the series

$$\sum_{n=1}^{\infty} \frac{\cos^2(1/n)}{\sqrt{n^3 + 1}}$$

converge or diverge?

5. Does the series

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

converge absolutely, converge, or diverge?

6. Find the interval of convergence for the power series

$$\sum_{n=0}^{\infty} \frac{(-3)^n (x-1)^n}{\sqrt[3]{n+3}}.$$

Answers

1. Converges to $45/16$.

2.

$$\tan x = x + \frac{1}{3}x^3 + \frac{1}{24}x^4(8 \sec^2 z \tan^3 z + 16 \sec^4 z \tan z)$$

where z is some real number between 0 and x .

3. Diverges (you could use the integral test)

4. Converges (you could use comparison tests)

5. Converges absolutely

6. $(2/3, 4/3]$