Math 1AA3/1ZB3

Extra Section 11.9 Questions

- Updated Feb. 11, 2021

1. Find a power series representation of

$$f(x) = x\tan^{-1}x$$

(a) $\sum_{n=0}^{\infty} \frac{(-1)^n}{n+1}x^{n+2}$ **(b)** $\sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1}x^{2n+1}$ **(c)** $\sum_{n=0}^{\infty} (-1)^n 2n\, x^{2n}$

(d) $\sum_{n=0}^{\infty} \frac{1}{2n+1}x^{2n+2}$ **(e)** $\sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1}x^{2n+2}$

2. Suppose that a function f has the following series:

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

Find the radius of convergence.

(a) 4 **(b)** 0 **(c)** 3 **(d)** 1 **(e)** ∞

3. Find a power series representation of

$$f(x) = \frac{x^2}{27+x^3}$$

(a) $\sum_{n=0}^{\infty} \frac{(-1)^{3n}x^{3n+2}}{27^n}$ **(b)** $\sum_{n=0}^{\infty} \frac{(-1)^{n}x^{3n+2}}{27^{n+1}}$ **(c)** $\sum_{n=0}^{\infty} \frac{(-1)^{n}x^{3n}}{27^{n}}$

(d) $\sum_{n=0}^{\infty} \frac{(-1)^{3n}x^{3n+1}}{27^{n+1}}$ **(e)** $\frac{1}{27}\sum_{n=0}^{\infty} (-1)^n x^{n+2}$

4. Find the sum of the series

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

(a) $\frac{6}{(1-x)^4}$ **(b)** $\frac{1}{(1-x)^2}$ **(c)** $\frac{-2}{(1-x)^3}$ **(d)** $\frac{2}{(1-x)^3}$ **(e)** $-\frac{6}{(1-x)^4}$

5. Find the sum of the series $\sum_{n=1}^{\infty} n\left(\frac{x}{2}\right)^{n-1}$ at $x = 1/2$

a) $\frac{4n}{3}$ **b)** $\frac{16}{9}$ **c)** $\frac{4}{25}$ **d)** $\frac{2}{9}$ **e)** Cannot be determined

Answers:

1. e **2.** c **3.** b **4.** d **5.** b