Math 2300 **Name:** _____
Spring 2026
Quiz 13

1. (1 point) Which of the following is the Taylor Series for $f(x) = x^2 \sin(5x^3)$ centered at $a = 0$?

   (a) $\displaystyle\sum_{n=0}^{\infty} (-1)^n \frac{5^{2n+1}}{(2n+1)!} x^{6n+5}$

   (b) $\displaystyle\sum_{n=0}^{\infty} \frac{5^n}{(3n+2)!} x^{3n+2}$

   (c) $\displaystyle\sum_{n=0}^{\infty} (-1)^n \frac{5^n}{(6n+5)!} x^{6n+5}$

   (d) $\displaystyle\sum_{n=0}^{\infty} (-1)^n \frac{(2n)!}{5^{2n}} x^{6n+1}$

   (e) $\displaystyle\sum_{n=0}^{\infty} \frac{x^{3n+2}}{(2n+1)!}$

2. (1 point) Calculate the value of the given series:

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}(-2)^n}{n \cdot 3^n}$$

   (a) $\dfrac{-2/3}{1-2/3} = -2$ (b) $\ln\left(\dfrac{1}{3}\right)$ (c) $\arctan\left(\dfrac{2}{3}\right)$ (d) $-\ln\left(\dfrac{2}{3}\right)$ (e) $\sin\left(\dfrac{2}{3}\right)$

3. (1 point) Find a power series representation of

$$\int \frac{x^2}{1-x^3}\, dx.$$

   (a) $C + \displaystyle\sum_{n=0}^{\infty} \frac{x^{3n+2}}{3n+2}$

   (b) $C + \displaystyle\sum_{n=0}^{\infty} \frac{x^{3n+3}}{3n+3}$

   (c) $C + \displaystyle\sum_{n=0}^{\infty} \frac{x^{n+3}}{n+3}$

   (d) $C + \displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n x^{3n+3}}{3n+3}$

   (e) $C + \displaystyle\sum_{n=0}^{\infty} \frac{x^{3n}}{3n}$

4. (4 points) Let $f(x) = x\ln(x)$. Find the Taylor series for $f(x)$ centered at $a = 3$.

5. (3 points) What aspects of MATH 2300 were most helpful for your learning this semester? Is there anything you wish had been added, changed, or done differently to better support your learning?