

Math 2315 - Calculus 2

Quiz #17 - 2017.04.11

Solutions

Compute the Maclaurin series for $f(x) = x^2 \cos(2x)$.

First, remember that

$$\cos(x) = \sum_{k=0}^{\infty} (-1)^k \frac{1}{(2k)!} x^{2k},$$

so

$$\begin{aligned} \cos(2x) &= \sum_{k=0}^{\infty} (-1)^k \frac{1}{(2k)!} (2x)^{2k} \\ &= \sum_{k=0}^{\infty} (-1)^k \frac{2^{2k}}{(2k)!} x^{2k} \\ &= \sum_{k=0}^{\infty} (-4)^k \frac{1}{(2k)!} x^{2k}. \end{aligned}$$

We can multiply this entire series by x^2 to get

$$x^2 \cos(2x) = \sum_{k=0}^{\infty} (-4)^k \frac{1}{(2k)!} x^{2(k+1)}.$$