P14

Find the general form & the first 4 terms of the maclaurin for $f(x) = \sin(2x^2)$

Know: $f(x) = \sin x = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n+1}}{(2n+1)!}$

$= x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$

$f(x) = \sin(2x^2) = \sum_{n=0}^{\infty} \frac{(-1)^n (2x^2)^{2n+1}}{(2n+1)!}$

$= \sum_{n=0}^{\infty} \frac{(-1)^n 2^{2n+1} x^{4n+2}}{(2n+1)!} = 2x^2 - \frac{8x^6}{3!} + \frac{32x^{10}}{5!} - \frac{128x^{14}}{7!} + \dots$

P15

Find the general form & the first 4 terms of the maclaurin for $f(x) = \ln(1-2x)$

Know: $f(x) = \ln(1+x) = \sum_{n=0}^{\infty} \frac{(-1)^n x^{n+1}}{n+1}$

$= x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$

Rewrite

$f(x) = \ln(1-2x)$

$= \ln(1+(-2x))$

$f(x) = \ln(1-2x) = \sum_{n=0}^{\infty} \frac{(-1)^n (-2x)^{n+1}}{n+1}$

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

$= -2x - \frac{4x^2}{2} - \frac{8x^3}{3} - \frac{16x^4}{4} - \dots$