4. As defined in the textbook, the general form of a power series is \( \sum_{n=0}^{\infty} c_n (x-a)^n \)

(a) For the polynomial \( 2 + x^2 + x^5 \), determine \( a, c_0, c_1, c_2, c_3, c_4, \) and \( c_5 \).

(b) Is \( 2 + x^2 + x^5 \) a power series?

(c) Write at least the first three nonzero terms for the series \( \sum_{n=1}^{\infty} \frac{(-1)^n}{2^n n}(x-4)^{2n} \).

(d) Repeat part (a) for the power series \( \sum_{n=1}^{\infty} \frac{(-1)^n}{2^n n}(x-4)^{2n} \).

(f.e., determine \( a, c_0, c_1, c_2, c_3, c_4, \) and \( c_5 \).)

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**Solution.**

(a) \( 2 + x^2 + x^5 = 2 + 0x + 1x^2 + 0x^3 + 0x^4 + 1x^5 \)

So \( a = 0, \quad c_0 = 2, \quad c_1 = c_3 = c_4 = 0, \quad c_2 = 1, \quad c_5 = 1 \)

\( (c_n \text{ is the coefficient of } x^n). \)

(b) A polynomial is a power series.