P1

What is the general form for a Taylor Polynomial

$$f(x) = \sum_{n=0}^{\infty} a_n (x-c)^n$$

$$= a_n + a_n(x-c)^1 + a_n(x-c)^2 + \ldots + a_n(x-c)^n$$

P2

What is the general form for $f(x) = \frac{1}{1-x}$ centered at $c=0$?

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

$$= 1 + x^1 + x^2 + x^3 + x^4 + \ldots + x^n$$

General form centered at $c=0$.

P3

What is the general form for $f(x) = \frac{1}{1+x}$ centered at $c=0$

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

$$= 1 - x^1 + x^2 - x^3 + x^4 - x^5 + \ldots + (-1)^n x^n$$

General form centered at $c=0$.

P4

Rewrite $f(x) = \frac{x}{x^3-1}$ as a power series and find the Interval of Convergence (I.O.C)

$$f(x) = \frac{x}{x^3-1} = \frac{x}{-1}\left(\frac{1}{1-x^3}\right) = -x\left(\frac{1}{1-x^3}\right)$$

Know: $\frac{1}{1-x} = 1 + x + x^2 + x^3 + \ldots + x^n = \sum_{n=0}^{\infty} x^n$

$$f(x) = -x\left(\frac{1}{1-x^3}\right) = -x(1) - x(x^3)^1 - x(x^3)^2 - x(x^3)^3$$

$$-x - x^4 - x^7 - x^{10} - \ldots = \sum_{n=0}^{\infty} -x^1(x^3)^n = \sum_{n=0}^{\infty} -x^{3n+1}$$

I.O.C $|x^3| < 1$ $\sqrt[3]{x^3} < \sqrt[3]{1}$ and $\sqrt[3]{x^3} > \sqrt[3]{-1}$

$x < 1$ and $x > -1$

$-1 < x < 1$ OR $(-1, 1)$