

Section 9.9

Operations with Power Series: Let $f(x) = \sum a_n x^n$ and $g(x) = \sum b_n x^n$.

1. $f(kx) = \sum_{n=0}^{\infty} a_n k^n x^n$
2. $f(x^N) = \sum_{n=0}^{\infty} a_n x^{nN}$
3. $f(x) \pm g(x) = \sum_{n=0}^{\infty} (a_n \pm b_n) x^n$

- 1) Find a geometric power series for the function, centered at 0 a) by using the properties of a geometric series, and b) by using long division.

$$f(x) = \frac{2}{5-x}$$

- 2) Find a power series for the function, centered at c , and determine the interval of convergence.

a) $f(x) = \frac{3}{2x-1}$, $c = 2$

b) $g(x) = \frac{3x-8}{3x^2+5x-2}$, $c = 0$

- 3) Use the power series

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

to determine a power series, centered at 0, for the function. Identify the interval of convergence.

a) $f(x) = \frac{2}{(x+1)^3} = \frac{d^2}{dx^2} \left[\frac{1}{x+1} \right]$

b) $f(x) = \arctan 2x$