Section 8.9: Representation of Functions by Power Series

A. Finding a Geometric Power Series that represents a given function.

1. Use the fact that $\sum_{n=0}^{\infty} ar^n = \frac{a}{1-r}$, $|r| < 1$
2. Write the given function in the from $\frac{a}{1-r}$ to find the value of a and r.
3. Write as a power series.

- If the power series is not centered at 0, replace x with (x – c) and then undo the addition/subtraction in the denominator.

Examples: 2ab, 6, 8, 12, 18

B. Finding a Power Series By Integration (Optional)

See page 629

C. Operations with Power Series

Let $f(x) = \sum_{n=0}^{\infty} a_n x^n$ and $g(x) = \sum_{n=0}^{\infty} b_n x^n$

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. $f(x) + g(x) = \sum_{n=0}^{\infty} (a_n \pm b_n) x^n$