9.9 Representation of functions by power series

To get a geometric power series centered at c
(the Taylor series at c):

1. Separate x-c.
2. Divide everything by the constant term in the denominator to get a 1 in the denominator.
3. Identify a and r for the geometric series.

ex. Find a geometric power series centered at 0 for $f(x)= \frac{3}{2-x}$

ex. Find a geometric power series centered at 0 for f(x)= $\frac{3}{4-x}$

also find the interval of convergence.

Thm. Let $f(x)= \sum a_n x^n$ and $g(x)= \sum b_n x^n$ then

1. $f(kx)= \sum a_n k^n x^n$
2. $f(x^m)= \sum a_n x^{nm}$
3. $f(x)\pm g(x)=(a_n \pm b_n)x^n$

Note that these may change the interval of convergence.

ex. Find a geometric power series centered at 2 for f(x)= $\frac{3}{4-x}$

ex. For $\frac{1}{1+x} = \sum_{n=0}^{\infty} (-1)^n x^n$ Find the following:

$\frac{1}{1-x}$

$\frac{1}{1+x^3}$

$-(1+x)^{-2}$

$\ln|1+x|$