Name: ____

Scaled to 10 points.

Math 182 Problems Section: 10.6 Due: 5 April 2018

1. Use the geometric series

$$\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}, \qquad \text{for} \qquad |x| < 1$$

to find a series representation for the following functions at the specified center.

- (a) $2 g(x) = \frac{2x}{1+x}, c = 0$ (b) $2 h(x) = \frac{2}{(1+x)^2}, c = 0$ (c) $2 k(x) = \frac{2}{1+x}, c = 3$ HINT: $\frac{2x}{1+x} = 2x\frac{1}{1+x}$ HINT: $\frac{2}{(1+x)^2} = \frac{d}{dx}\frac{2x}{1+x}$ HINT: See #41 in the exercises.
- 2. Consider the function defined by

$$f(x) = \sum_{n=1}^{\infty} \frac{(x-2)^n}{n(-2)^n}$$

- (a) 2 Find the radius of convergence of f(x).
- (b) 2 Find the interval of convergence of f(x).

Theorem 2 tells us that we can integrate and differentiate a power series and that the radius of convergence does not change. However, the interval of convergence often does.

- (c) |1| Find a series representation for f'(x).
- (d) 2 Find the interval of convergence for the series representation of f'(x).
- (e) 1 Find a series representation for $F(x) = \int f(x) dx$.
- (f) 2 Find the interval of convergence for the series representation of F(x).