Math 151 **Name (Print):** _____
Spring 2021 TA: _____
Week 12 Section # _____

1. (a) Use the fact that $\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}$ to find a power series representation for $f(x) = \frac{1}{(1+x)^2}$
What is the radius of convergence?

(b) Use part (a) to find a power series for $g(x) = \frac{1}{(1+x)^3}$

(c) Use part (b) to find a power series for $h(x) = \frac{x^2}{(1+x)^3}$

2. For the following functions:
(i) Find the Taylor series polynomial of order 4 about $x = x_0$.
(ii) Sketch the function (solid line), its linear approximation (thin line), and its quadratic approximation (dashed line). Do NOT use a computer, just draw you own quick sketch!

(a) $f(x) = \frac{1}{(1-x)^2}$ about $x_0 = 0$

(b) $g(x) = \ln(1+x)$ about $x_0 = 2$

(c) $h(x) = \cos(Bx)$ about $x_0 = 0$

(d) $k(x) = x^2 + 1$ about $x_0 = \alpha$. For the Taylor series do NOT evaluate α. However, for the sketch, do TWO sketches one for $\alpha = 0$ and one for $\alpha = 1$.