Worksheet 15

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Find a power series representation for the function and determine the interval and radius of convergence.

1. $f(x) = \dfrac{3}{1-x^4}$.
2. $f(x) = \dfrac{1+x}{1-x}$.
3. $f(x) = \dfrac{x+2}{2x^2-x-1}$.
4. $f(x) = \dfrac{x^2}{(1-2x)^2}$
5. $f(x) = \arctan(x/3)$.
6. $f(x) = \dfrac{x}{x^2+16}$.
7. $f(x) = \ln(x^2+4)$.
8. Starting with the geometric series $\sum_{n=0}^{\infty} x^n$, find the sum of the series
   (a) $\displaystyle\sum_{n=1}^{\infty} nx^{n-1} \quad |x|<1.$
   (b) $\displaystyle\sum_{n=1}^{\infty} nx^{n} \quad |x|<1.$
   (c) $\displaystyle\sum_{n=1}^{\infty} \frac{n}{2^n}.$
   (d) $\displaystyle\sum_{n=2}^{\infty} n(n-1)x^{n} \quad |x|<1.$
   (e) $\displaystyle\sum_{n=1}^{\infty} \frac{n^2-n}{2^n}.$
   (f) $\displaystyle\sum_{n=1}^{\infty} \frac{n^2}{2^n}.$