Homework Problems for Chapter 11, Section 9

(1) Find the power series centered at 0 that represents $f(x) = \dfrac{1}{1+x^4}$. Determine the interval of convergence of this power series.

(2) Find the power series centered at 0 that represents $f(x) = \dfrac{1}{25+x^2}$.

(3) Find the power series centered at 0 that represents $f(x) = \dfrac{x^3}{1+25x^2}$.

(4) Find the power series centered at 0 that represents $f(x) = \dfrac{1}{(x-2)(x-3)}$. Hint: Use partial fractions.

(5) Find the power series centered at 0 that represents $f(x) = \dfrac{x^{10}}{(4+x)^2}$. Hint: Use a function $g(x)$ such that $g'(x) = \dfrac{1}{(4+x)^2}$, and later multiply by x^{10}.

(6) Express $\displaystyle\int \frac{x - x^3/3 - \tan^{-1} x}{x^5}\,dx$ as a power series.

(7) Use a power series to approximate $\displaystyle\int_0^{1/2} \ln(1+x^2)\,dx$ with an accuracy better than 10^{-5}.