MAT 146, Spring 2019
Homework Assignment 7

Due before the start of the class on Wednesday, June 5

Section 2.7: 11. Find the radius of convergence of the following series:
(a) $\sum_{n=1}^{\infty} \frac{x^n}{n^2}$; (c) $1 + 5x^2 + 25x^4 + 125x^6 + \ldots$

A: (a) Find the coefficients of the power series

$$A(x) = \sum_{n=0}^{\infty} a_n x^n = \frac{1 - x}{(1 - 2x)(1 + 3x)}.$$

(b) Find the radius of convergence of this series.

B: The sequence $\{a_n\}$ satisfies the recurrence relation

$$15a_n - 5a_{n-1} + 3a_{n-2} - a_{n-3} = 0$$

with some initial conditions a_0, a_1, a_2.
(a) Find the radius of convergence of the series $\sum a_n x^n$.
(b) Estimate a_n without solving the recurrence.

C: Recall that the exponential generating function for the number of derangements equals

$$D(x) = \sum \frac{D_n}{n!} x^n = \frac{e^{-x}}{1 - x}.$$

(a) Find all poles of $D(x)$ and principal parts at these poles.
(b) Use "pole removal" procedure to estimate D_n.