1. Turn in the following problems on August 31 (Thursday). One point each.
   a. Are functions $x$ and $x^2$ linearly independent? Are $\sin(x)$ and $\cos(x)$ linearly independent?
   b. What are singular points of $x(x^2 - 4)y'' + xy' + y = 0$?
   c. Does the differential equation $xy'' - (x^2 + 1)y' + xy = 0$ have two linearly independent power series solutions of the power $x - 1$?
   d. (i) Is $x = 0$ an ordinary point of the differential equation $(2x^2 - x - 1)y'' + xy' - y = 0$?
      (ii) What is the radius of convergence $R$ of the power series solution $\sum_{m=0}^{\infty} c_mx^m$ of this equation.
   e. Is $x = 0$ a regular singular point (or an irregular singular point) of $x^2(x - 5)^2y'' + 4xy' + (x^2 - 25)y = 0$?

2. Page 245: Turn in the following problems with * on September 5 (Tuesday).
      For each problem, show your work in detail and
      i. give the recurrence relation of $c_m$’s;
      ii. express each power series (in the solution) by its first 4 nonzero terms.
      Extra points: Give the exact form (find the limit function) of the general solution if it is possible.

   b. Page 245: *30
      Express each power series (in the solution) by the first 2 nonzero terms.