Math 135: Homework 8

Due Thursday, March 1

(1) In each of the following, find the general power series solution of the equation about $t = 0$. This includes finding the recursion formula and an expression for the kth term of the series.

   (a) $y'' - ty' - y = 0$

   (b) $(2 + t^2)y'' + 3ty' + y = 0$

(2) Show that for any vectors $\mathbf{a}$ and $\mathbf{b}$,

$$\big|\, \|\mathbf{a}\| - \|\mathbf{b}\| \,\big| \leq \|\mathbf{a} - \mathbf{b}\|$$

   (**Hint:** $\mathbf{a} = (\mathbf{a} - \mathbf{b}) + \mathbf{b}$.)

(3) Let T denote the tetrahedron centered at the origin O with vertices at the points $P_1(1, 1, 1)$, $P_2(-1, -1, 1)$, $P_3(1, -1, -1)$, and $P_4(-1, 1, -1)$. Using vector methods, find the cosines of the angles $\angle P_i O P_j$ for all $i \neq j$. What are the approximate angles (in degrees)?