GEO594/GLE594: Homework 3b – Seismic Reflection

Use the Dix Formula approach (RMS velocity) to determine the velocities and thicknesses for 3 layers using the following reflection data:

Offset x (m)	3	6	9	12	15	18	21	24	27	30	33	36
Reflection 1	21.4	25.0	30.1	36.1	42.5	49.2	56.2	63.3	70.4	77.6	84.9	92.2
Reflection 2	62.3	62.4	62.6	62.9	63.2	63.6	64.1	64.7	65.4	66.1	66.9	67.7
Reflection 3	79.4	79.5	79.6	79.9	80.1	80.5	80.9	81.3	81.8	82.4	83.0	83.7

Times are in milliseconds. First, make a graph of t^2-x^2 values for all 3 reflections. Note that the slope for the first reflector is simply $1/V_1^2$, but that for the deeper reflectors the slope corresponds to the RMS velocity. Use the first intercept and the single-layer travel time formula to determine the thickness of layer 1. Then from the slopes and the intercept values, use the Dix Formula to compute the interval velocities for layers 2 and 3. Finally, use the fact that $t_n - t_{n-1} = 2\, z_n/V_n$ to compute the thicknesses for layers 2 and 3.

You can use a spreadsheet to do this problem. However, you should also be able to complete the problem with graph paper – the kind that might be available during an exam, for example.