A linearly-graded Si pn junction with a linear doping gradient is at equilibrium, as shown below, where the gradient "m" is 7×10^{14} cm^{-4}.

a) The built in voltage of this junction is measured to be 0.65V. If the electron density at the edges of the depletion zone are: $p_p = qm(W/2)$ and $p_n = n_i^2/[qm(W/2)]$, calculate the depletion width. *(1.25pt)*

b) Calculate the electric field across the junction as a function of distance. ($\varepsilon_o = 8.85 \times 10^{-14}$F/cm) *(1.25pt)*

c) Quantitatively plot equilibrium values for the following vs distance: *(0.5 each)*
   i) electric field
   ii) voltage
   iii) energy bands

Make sure to label the axes with *numbers* showing calculated values of W, and max values of each quantity above) and *titles (including units)* in each case.