Project #3: Horizontal stresses computed with linear elasticity

Download the file LostHills.xls <https://github.com/dnicolasespinoza/GeomechanicsJupyter/tree/master/GradHomework>. We would like to know the state of stress in the subsurface and its influence on a hydraulic fracture completion. At every depth (and data-point) along the vertical well:

a. Compute (and plot) total vertical stress as a function of depth (you may assume homogeneous rock above 1750 ft), and overpressure parameter.
b. Compute dynamic Poisson's ratio and dynamic Young's modulus from compressive and shear slowness (be careful with unit conversion).
c. Compute static Young's modulus using a coefficient $E_{static} = 0.65 * E_{dynamic}$
d. Compute (and plot) static plane strain modulus $E'_{static} = E_{static} / (1-\nu^2)$ (Poisson ratio remains the same).
e. Compute (and plot) horizontal stress assuming theory of elasticity and no tectonic strains.
f. Compute (and plot) total maximum and minimum horizontal stress assuming theory of elasticity and $\varepsilon_{Hmax}=0.0015$ and $\varepsilon_{hmin}=0$.
g. The pay-zone is between 2,100 ft and 2,450 ft. A hydraulic fracture is planned to be executed with a vertical well at a depth between 2,130 ft and 2,160 ft. What will be the height of this fracture? Will it reach out to the entire pay zone?