Comp exam

CE202A Vadose Zone Hydrology

(a) Compare between the soil-water retention curves of clay-rich vs. sand rich soils.
(b) What is the effect of compaction on the soil-water retention curve?
(c) How does pore-size distribution relate to the soil water retention curve.
(d) Next, you are asked to consider the profiles of soil moisture and the pressure head between ground surface and a shallow water table. In each item below you are asked to explain your results and state your assumptions and modeling choices.

- Plot schematically the pressure head and soil moisture profiles in the case of steady state infiltration. Neglect root uptake effects. Indicate what determines the shape of the curves next to the water table.
- Show how these profiles will change in response to a decrease in the infiltration (several snapshots).
- Show how the moisture profile will change in the presence of root uptake, considering various rates of root uptake and for different values of rooting depth.

CE202B Geostatistics and Stochastic Hydrogeology

Consider the following two soil properties: conductivity (X) and dielectric constant (Y). The following relationship was identified between the two variables: $X=aY+\varepsilon$, where ε is a normal, zero mean random variable with variance σ^2.

(1) Plot a scatterplot of X vs. Y for a (1) positive a with small σ^2, (2) positive a with zero σ^2, (3) negative a with a large σ^2

(2) Discuss and demonstrate, using a concrete example of your choice (incl. Geostat models, configuration of measurements vs. estimation point, choice of kriging estimators, etc), how to obtain kriging estimates of X (1) given only X-type measurements; (2) given measurements of both X and Y.