EPSc 413 Homework #2
Due February 15, 2017

Write answers on separate sheets of paper. Please only write on one side of the page to make grading easier. Answers may also be typed.

1. *This question is designed to familiarize you with soil textures.*

    a. Assign a soil texture class to each of the soils in the table based on the relative percentages of sand, silt, and clay. **(10 pts)**

Soil	% Sand	% Silt	% Clay
1	9	47	44
2	39	42	19
3	23	68	9
4	57	28	15
5	17	29	54

    b. Which soil would you choose if you had an application that required rapid drainage of water when it rained? Why? **(6 pts)**

    c. Two former industrial sites contain buried drums of organic chemicals consider water pollutants. One site has soil type 2 and the other has soil type 5. Which sites has the greatest potential for contaminants being released into the environment if a drum ruptures? Why? **(6 pts)**

2. *This question asks you to familiarize yourself with soil density and porosity concepts.*
You are working as a soil scientist and have a contract for a local university to sample three different soils. You use a soil corer with an internal diameter of 5 cm and obtain a soil core 7.5 cm in length at each location.

Sample	Sample Dry Mass (g)
A	187.1
B	254.8
C	61.9

    a. Using the dry mass values in the table, calculate the bulk density and percent porosity of each soil using a particle density (D_P) of 2.65 g/cm^3. **(12 pts)**

You inadvertently lose your notes (it's your first week) and don't know which sample goes with which sampling location. Your boss, Molly Sauls, is not pleased and wants you to figure out where each sample was taken from. You know that two samples are from a lawn; one is from the middle of the lawn and the other is from a part of a lawn that students have decided to use as a footpath instead of the nearby sidewalk. The third sample is a histosol from a nearby wetland. All three soil samples are dark in color because the lawn is well fertilized, so you are not able to confidently distinguish the samples based simply on color

    b. Which soil is likely from the footpath portion of the lawn? Why? **(8 pts)**

    c. Which soil is likely the histosol? For this soil, recalculate the percent porosity assuming a particle density of 0.96 g/cm^3, and briefly explain why this new porosity value is likely more correct. **(8 pts)**

3. *This question requires you to become familiar with soil water retention curves.*
Consider the water retention curves for the following two soils:
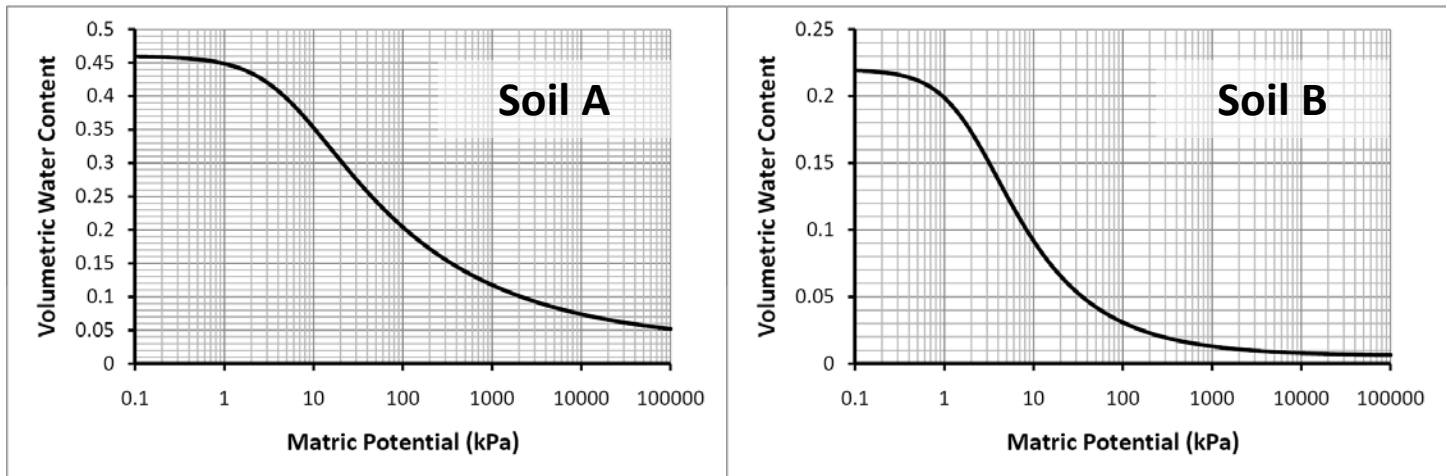
Note: The x-axis values should all be negative.

a. For each soil water retention curve, estimate the maximum retentive capacity, the field capacity, the wilting coefficient, and the hygroscopic coefficient. **(12 pts)**

b. Which soil likely has a sandy texture? Briefly explain your reasoning. **(6 pts)**

c. For each soil, determine the available water holding capacity (AWHC) for the top 15 cm of the soil profile. Assume that the water retention curves are uniform for the top 15 cm of the soils, i.e., they do not change with depth. **(8 pts)**

4. *This question is designed to familiarize you with soil water budget concepts.*
a. What is the difference between evapotranspiration (ET) and potential evapotranspiration (PET)? **(12 pts)**

b. If potential evapotranspiration exceeds precipitation in a given month, will the volumetric soil water content increase or decrease? Why? **(12 pts)**