53:030 SOIL MECHANICS

Civil & Environmental Engineering

The University of Iowa

FALL SEMESTER, 2001

Homework Assignment # 2, Due Wednesday, 19 September.

From the textbook, solve problems: 1.4 – 1.7

Additional Questions:

1) Consider the data in Table 1 obtained from the sieving of two different soil samples.
   a) Compute and plot the GSD for both soils on the same axes.
   b) For both soils, compute the uniformity coefficient, the coefficient of gradation, and the sorting coefficient.
   c) Based on both the GSDs and the coefficients, briefly describe the qualitative differences between soil samples A and B.

Table 1.

Sieve #	Size	D(mm)	Soil A	Soil B
			Mass retained (kg)	Mass retained (kg)
1	#4	4.75	0	.10
2	#10	2.00	0	.15
3	#20	0.85	0	.18
4	#40	.425	0.40	.13
5	#60	.250	0.41	.13
6	#100	.150	.165	.12
7	#140	.106	.01	.08
8	#200	.075	.008	.07
9	pan	0.0	.007	.04
			1.000	1.000

2) The following data were obtained from the liquid and plastic limit tests for a soil:

Liquid Limit test results

Number of Blows (N)	Water content (%)
15	42.0
20	41.8
28	39.1

Plastic limit was found to be 18.7%.

a) Draw the flow curve from the liquid limit test data and find the liquid limit.
b) What is the plasticity index of the soil?
c) If the in-situ water content of this soil in the field is 22% what would its liquidity index be? What would you expect the consistency of the soil to be at this water content and liquidity index?

3) A saturated soil with a volume of 19.65 cm^3 has a mass of 36 grams. When the soil is completely dried, its volume and mass are 13.5cm^3 and 25 grams, respectively. Determine the shrinkage limit for this soil.

4) Consider the following Atterberg limits for different soil types. Based on the limits for each soil, show where it lies on the soil plasticity chart in relation to the U-line and A-line. Is any of the data suspect? If yes, which and why?
   a) LL=50%, PL=15%;
   b) LL=30%, PL=10%;
   c) LL=70%, PL=45%;
   d) LL=40%, PL=5%;