

Homework Assignment 3

Problem No. 1:

The recycling infiltrometer was installed to measure the infiltration in a field being furrow irrigated. The furrows in the field were spaced 0.75 m apart. The section of furrow actually tested was 6.5 m long with a cross-sectional shape that led to the following simplification of the Manning equation:

$$Q = (34.295) \frac{\sqrt{S_o}}{n} A^{1.367}$$

in which S_o is the slope of the furrow (0.8%), n is the Manning roughness coefficient (taken to be 0.04 in these measurements), A is the cross-sectional area in m^2 , and Q is the flow in m^3/min . The infiltrometer tank was circular with a 60-cm diameter. Water from it was pumped at a rate of 2.0 liters/s for a period of 6 hrs. The recorded water-level readings in the infiltrometer tank were as follows:

<i>Elapsed time of reading (min)</i>	<i>Tank reading (cm)</i>
0	150
5	138.6
10	133.5
20	126.1
30	120.3
60	107.0
90	96.6
120	87.8
240	59.9
360	38.1

Using these data, find the parameters for the cumulative Kostiakov infiltration function. If we assume the basic intake rate is 0.000059 m/min, what would be the Kostiakov-Lewis k , a , and f_o parameters?

Problem 2:

A cylinder infiltrometer is used to measure a soil's infiltration characteristics at one place in a field. The readings that were recorded from the test were as follows:

<i>Time of Readings, Clock Hours</i>	<i>Gauge Reading, Staff Reading, mm</i>
0800	187
0801	183
0802	182
0804	181
0806	180
0810	179
0820	177
0830	176
0900	173
1000	169
1100	166
1200	163

1400	158
1600	153
1800	149
2400	137
0300	131
0600	126
0840	122

What are the Kostiakov intake parameters, a and k ?