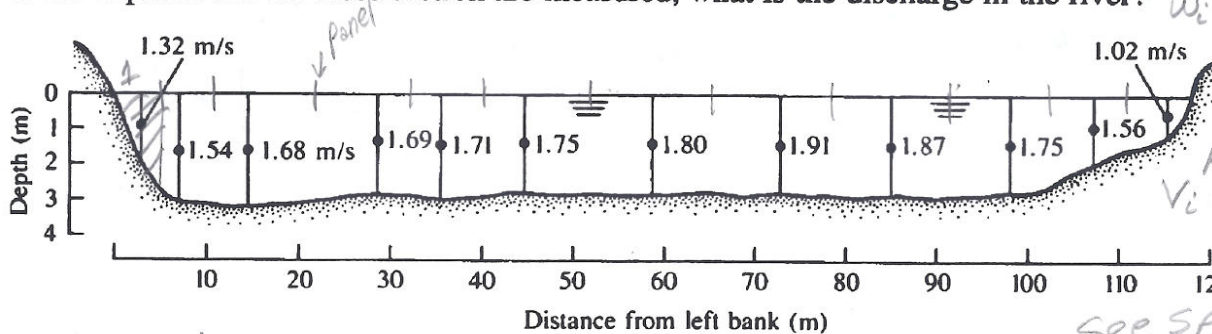
2. Find the discharge and the kinetic energy and momentum correction factors for channel and data illustrated in the attached diagram and table. You may use a spreadsheet.

Theory and experimental verification indicate that the mean velocity along a vertical line in a wide stream is closely approximated by the velocity at 0.6 depth. If the indicated velocities at 0.6 depth in a river cross section are measured, what is the discharge in the river?

$W_i = \frac{S_2 + S_3}{2} - W_{i,1}$



$A_i = W_i(y_i)$

$V_i A_i = \Delta Q$

See spread sheet

Table of data

Panel	Depth d m	Lateral distance from left m	measured velocity Vi m/s	wi	Ai	ViAi (ΔQ_i)	Vi^2Ai	Vi^3Ai
Bank	0	0.0	0	0	0	0	0	0
1	1.93	2.7	1.32	4.9	9.46	12.48	16.48	21.75
2	3.03	7.1	1.54	6.05	18.33	28.23	43.47	66.95
3	3.17	14.8	1.68	10.85	34.39	57.78	97.08	163.09
4	2.76	28.8	1.69	10.40	28.70	48.51	81.98	138.55
5	2.90	35.6	1.71	8.05	23.35	39.92	68.26	116.73
6	2.76	44.9	1.75	11.80	32.57	56.99	99.74	174.54
7	2.76	59.2	1.8	13.85	38.23	68.81	123.85	222.93
8	2.76	72.6	1.91	12.85	35.47	67.74	129.38	247.12
9	2.76	84.9	1.87	12.75	35.19	65.81	123.06	230.11
10	2.76	98.1	1.75	11.10	30.64	53.61	93.82	164.19
11	1.93	107.1	1.56	8.60	16.60	25.89	40.39	63.01
12	1.10	115.3	1.02	5.35	5.89	6.00	6.12	6.25
Bank	0.00	117.8	0					
Sums	—	—	—	-	308.8	531.78	923.64	1615.23
							momentum	kinetic energy

Q= ΣQ_i 531.78 m^3/s

α= $\frac{\Sigma V_i^3 A_i}{V^3 \Sigma A} = 1.028$

β= $\frac{\Sigma V_i^2 A_i}{V^2 A} = 1.011$

$V = \Delta Q / \Sigma A_i = 531.78 / 308.8 = 1.72$

$\alpha = \frac{\Sigma V_i^3 A_i}{V^3 \Sigma A_i} = \frac{1615.23}{(1.72)^3 (308.8)} = 1.028$

$A = \Sigma A_i$

$\beta = \frac{\Sigma V_i^2 A_i}{V^2 \Sigma A_i} = \frac{923.64}{(1.72)^2 (308.8)} = 1.011$