Dear students,

Below are the solutions to assignment #2.

4.7* On a large lake without waves, how far from shore is a sailboat when the top of its 30-ft mast disappears from the view of a person lying at the water's edge?

$$F = 1000\sqrt{\frac{30}{0.0206}} = 38{,}161 \text{ ft} = 7.228 \text{ mi}$$

4.8 Similar to Problem 4.7, except for a 10-m mast and a person whose eye height is 1.5 m above the water's edge.

$$K = \sqrt{\frac{1.5}{0.0675}} + \sqrt{\frac{10}{0.0675}} = 16.886 \text{ km}$$

5.12 Prepare a set of level notes for the data listed. Perform a check and adjust the misclosure. Elevation of BM 7 is 852.045 m. If the total loop length is 1500 m, what order of leveling is represented? (Assume all readings are in feet)

BM 7	9.432		
TP 1	6.780	8.363	
BM 8	7.263	9.822	
TP 2	3.915	9.400	
TP 3	7.223	5.539	
BM 7		1.477	

STA	+	HI	−	ELEV
BM 7	9.432			852.045
		861.477	(−0.0024)	(853.112)
TP 1	6.780		8.363	853.114
		859.894	(−0.0048)	(850.067)
BM 8	7.263		9.822	850.072
		857.335	(−0.0072)	(847.928)
TP 2	3.915		9.400	847.935
		851.85	(−0.0096)	(846.301)
TP 3	7.223		5.539	846.311
		853.534	(−0.0120)	(852.045)
BM 7			1.477	852.057
	34.613		34.601	
Page check	852.045 + 34.613 − 34.601			852.057
Misclosure =	852.057 − 852.045		0.012	
Correction =	−0.012/5 =	−0.0024		

From Equation 5.3: $m = 12 \text{ mm}/\sqrt{0.5} = 9.8 \text{ mm}$, **third order**

5.15 A differential leveling circuit began on BM Hydrant (elevation 4823.65 ft) and closed on BM Rock (elevation 4834.47 ft). The plus sight and minus sight distances were kept approximately equal. Readings (in feet) given in the order taken are 2.65(+S) on BM Hydrant, 3.51 (−S) and 7.23 (+S) on TP1, 5.04 (−S) and 11.41 (+S) on BM 1, 8.58 (−S) and 7.65 (+S) on BM 2, 4.23 (−S) and 7.53 (+S), on TP2, and 4.34 (−S) on BM Rock. Prepare, check, and adjust the notes.

Sta	+sight	HI	-sight	Elev	Adj. Elev	Corr.
HYDRANT	2.65			4823.65	4823.65	
		4826.30				
TP1	7.23		3.51	4822.79	4822.80	0.010
		4830.02				
BM1	11.41		5.04	4824.98	4825.00	0.020
		4836.39				
BM2	7.65		8.58	4827.81	4827.84	0.030
		4835.46				
TP2	7.53		4.23	4831.23	4831.27	0.040
		4838.76				
ROCK			4.34	4834.42	4834.47	0.050
sum	36.47		25.70			

Misclosure: 4834.42 - 4834.47 = -0.05
Page Check: 4823.65+36.47-25.70=4834.42

5.22 Reciprocal leveling gives the following readings in meters from a set up near *A:* on *A*, 1.365; on *B,* 4.928, 4.924, and 4.926. At the setup near *B:* on *B,* 4.251; on *A,* 0.687, 0.688, and 0.689. The elevation of *A* is 564.872 m. Determine the misclosure and elevation of *B.*

568.434 m

From A: $\Delta Elev_{AB} = \frac{4.928+4.924+4.926}{3} - 1.365 = 4.926 - 1.365 = 3.561$

From B: $\Delta Elev_{AB} = 4.251 - \frac{0.687+0.688+0.689}{3} = 4.251 - 0.688 = 3.563$

$Elev_B = 564.872 - \frac{3.561 + 3.563}{2} = 564.872 + 3.562 = \mathbf{568.434\ m}$

GOOD LUCK,