University of Colorado Denver
Department of Civil Engineering
CVEN-5333 Surface Water Hydrology

ASSIGNMENTS and ANSWERS
dcm 8/19/2024

Except as noted, all problems refer to Bedient *et al*. (2019) 6th edition.

week	**notes**	**assignment**
1		(see handout)
2		1.19, 1.21, 1.27, 2.27, 2.28, 2.30, 2.33
3		8.1, 8.3, 8.9, 2.34, 2.35
4		(see handout)
5		(see handout)
6	**1st midterm**	3.25, 3.28, 3.32
7		4.10, 4.11, 4.16 (use $x = 0.1$), 4.18, M-2005 11.7.2, M-2005 11.7.3
8		(see handout)
9		2.9, 2.10, 2.14, F-2002 1.7
10		2.7, 2.15, 2.16, 2.21, 2.24
11		(see handout)
12	**2nd midterm**	(see handout)
13		1.24, 6.4, 6.6, 6.12 (and handout)
14		(see handout)

Answers to Homework Problems
These partial answers will help determine whether you are on track. Some have been rounded.

<u>Week 1</u>

1	16 cm
2(b)(ii)	Sample A $T_d = 21°C$
3	RH = 78%
4	(b) Florida, (c) 902 mb, (d) absorbed into extratropical cyclone in Pennsylvania
5	Answers will vary.

<u>Week 2</u>

1.19(b)	3.041 in (you will need to round that)
1.21	i_{max} = 4.0 in/hr from 16:20-16:35
1.27	(a) i = 4 cm/hr from 0-0.5 hr (b) P = 38 cm (c) $Q_{peak} = 0.40\ m^3/s$
2.27	0.24 in
2.28	E = 0.056 in on day 14
2.30	f_o = 7.8 in/hr; f_c = 1.2 in/hr; k = 0.25 1/hr
2.33	(a) φ = 0.2 in/hr

Week 3

8.1	$q = 1\times10^{-6}$ cm/s; $v_s = 5\times10^{-6}$ cm/s
8.3	Q = 100 m^3/d; z = 47.1 m *(Hint, assume aquifer is completely saturated.)*
8.9	T = 3.8 ft^2/s
2.34	when F = 1 cm, f = 2.9 cm/hr; when F = 8 cm, f = 1.0 cm/hr
2.35	silt loam, low *n*, saturation time 2.3 hr

Week 4

1	63 cm
2(c)	134 cm of SWE remain at the end of April 5th
3	for temperature increase of 4°C, V = 4.4×10^6 m^3, 64% snowmelt, peak April 25th
4	Answers will vary.

Week 5

3.1	Time series indicates increased variability from 2000-2010.
3.2	(c) $C_w = -0.277$
3.3	(d) p = 0.00142
3.5	(a) Q_{100} = 38,000 cfs
3.6	(a) Q_{100} = 44,400 cfs
3.8	(a) Q_{100} = 41,300 cfs
3.11	*hint:* Sketch the normal PDF for each of the five questions.
3.24	(b) p = 22.2%

Week 6

3.25	Answers will vary.
3.28	Answers will vary.
3.32	Answers in problem statement.

Week 7

4.10	Q_p = 5.3 cfs; duration = 16.7 hr
4.11	Q = 35 cfs at 228 hr
4.16	at 20 hr, I = 66 m^3/s, Q = 163 m^3/s
4.18	This is a "show that..." problem.
11.7.2[1]	(from Mays 2005) V = 10,123 ac-ft (do not use ΣQF_i column in Table 11.7.1)
11.7.3	(from Mays 2005) V = 7,223 ac-ft

Week 8

4.23	at 4 km, Q_p = 28.96 m^3/s at 180 min
6.8	impervious A = 0.49 ac; t_c = 5.48 min
6.9	D = 18 in
6.19	peak 19.2 cfs

[1] Mays (2005) Table 11.7.1. The cumulative volume for January 1966 should be 4,302 ac·ft, not 3,302 ac·ft as stated. This error propagates through the remainder of Table 11.7.1.

Week 9

2.9 (a) peak 340 cfs at 6 hours
2.10 (a) peak 1,560 cfs at 7 hours
(b) peak 750 cfs at 4 hours
(c) peak 1,160 cfs at 3 hours
2.14 Hint, use the following chart to show Q_p = 367 m^3/s at 4.0 hours:

time [hr]	0-0.5	0.5-1	1-1.5	1.5-2	2-2.5
i [cm/hr]	0.75	1.5	3.0	1.75	0.5
f [cm/hr]	0.25	0.2	0.2	0.1	0.1

1.7 Q_{DRO} peaks at ±3.2 m^3/s at ~15 hr. ← *from Fitts (2002)*

Week 10

2.7 T_R = 4.65 hr; Q_p = 406 cfs
2.15 max(UH_{15}) = 125 cfs/in at 45 min
2.16 max(UH_2) = 362.5 cfs/in at 4 hr
2.21 T_R = 7.2 hr; Q_p = 670 cfs
2.24 max(UH) = 1978 cfs/in at 9.7 hr

Week 11

1 Complete exercise.
2 Match example in text.

Week 12

Note error, Page 287, Example 6.A.1, last equation should be:

$$D_c = \frac{0.2d^{-1}}{0.4d^{-1}}(4.3mg/L)\exp\left(-0.2d^{-1} \times 61km/41kmd^{-1}\right) = 1.6mg/L,$$

where the "-0.2 d^{-1}" is "$-k_1$", per equation (6.A.13).

Nazaroff and Alvarez-Cohen (2001) 6.12 Short essay.
Nazaroff and Alvarez-Cohen (2001) 6.55 k_1 = 0.17/d; BOD_o = 7.9 mg/L; D_c = 2.7 mg/L

Week 13

1.24 (c) 25± year storm
6.4 6 events when MIT = 3 hr
6.6 i_{max} = 3.67 in/hr at 12 hr using Table E6-4
6.12 maximum outflow 9.5 cfs at 90 minutes
extra 15-minute 10-year average intensity is 3.08 in/hr

Week 14

1 Complete exercise.
2 Essay question.