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

ASSIGNMENTS and ANSWERS
dcm 1/23/2019

Except as noted, problem numbers refer to the 5th edition of the textbook (Bedient *et al.* 2013).
Brown text gives equivalent problems from the 4th edition of the textbook (Bedient et al. *2008).*

week	notes	assignment
1		(see handout)
2		1.19, 1.21, 1.27, 2.28, 2.29, 2.31, 2.34 *1.5, 1.3, 1.12, 1.22, 1.23, 1.25, 1.28*
3		8.1, 8.3, 8.9, 2.35, 2.36 *8.1, 8.3, 8.9, 1.30, 1.31*
4		(see handout)
5		3.1, 3.2, 3.3, 3.5, 3.6, 3.8, 3.11, 3.24 *3.1, 3.2, 3.3, 3.5, 3.6, 3.7, 3.11, 3.24*
6	**1st midterm**	3.25, 3.29, 3.32 *3.26, 3.30, 3.33*
7		4.10, 4.11, 4.16, 4.18, M-2005 11.7.2, M-2005 11.7.3 *4.3, 4.4, 4.20, 4.12, M-2005 11.7.2, M-2005 11.7.3*
8		4.23, 6.8, 6.9, 6.19, 6.21 *4.25, 6.8, 6.9, 6.19, 6.21*
9		2.9, 2.10, 2.14, F-2002 1.7 *2.3, n/a, 2.12, F-2002 1.7*
10		2.7, 2.11, 2.15, 2.21, 2.24 *2.11, n/a, n/a, n/a, n/a*
11		(see handout)
12	**2nd midterm**	(see handout)
13		1.24, 6.4, 6.6, 6.12 (and handout) *1.15, 6.4, 6.6, 6.12*
14		(see handout)

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

Week 1

1.7	16 cm
1.11(b)(ii)A	T_d = 21 C
1.12(a)	ρ = 1.23 kg/m^3
1.13	RH = 78%
1.17	→ see homework assignment for updated website on Hurricane Katrina (2005)

Week 2

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 = 10 cm/hr from 0-0.5 hr, etc. (b) P_{total} = 52.5 cm. (c) Q_{peak} = 14 ft^3/s.
2.28	0.24 in
2.29	E = 0.056 in on day 14
2.31	f_o = 7.8 in/hr; f_c = 1.2 in/hr; k = 0.25 1/hr
2.34	(a) φ = 0.2 in/hr

Week 3

8.1	$q = 1x10^{-6}$ cm/s; $v_s = 5x10^{-6}$ 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
2.35	when F = 1 cm, f = 2.9 cm/hr; when F = 8 cm, f = 1.0 cm/hr
2.36	silt loam, low n, saturation time 2.3 hr; sandy clay, high n, saturation time 0.4 hr

Week 4 (to be announced)

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.
3.29	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 30 hr, I = 60 m^3/s, Q = 88 m^3/s
4.18	This is a "show that..." problem.
11.7.2*	(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

* 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 8

4.23 at 4 km, Q_p = 28.96 m^3/s at 180 min *(Hint, use top width B = 18.2 m.)*

6.8 impervious A = 0.49 ac; t_c = 5.48 min

6.9 D = 18 in

6.19 peak 19.2 cfs

6.21 Manning's n = 0.4 $s/m^{1/3}$, but n = 0.013 $s/m^{1/3}$ for DCIA. t_c = 79.5 min.

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 = 142 cfs at 2.5 hours:

time [min]	0-30	30-60	60-90	90-120
i [cm/hr]	1.0	1.25	2.5	1.0
f [cm/hr]	0.75	0.5	0.4	0.3

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

Week 10

2.7 T_R = 4.7 hr; Q_p = 420 cfs

2.11 A = 310 acres; max(UH_3) = 62 cfs/in at 6 hr

2.15 max(UH_{15}) = 125 cfs/in at 45 min

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:

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

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 *Hint, for 1.24 and 6.6, reference Figure 1-15 (not Figure 1-8)*

1.24 (b) P = 8.16 in, (d) i_{max} = 4.4 in/hr between hours 3 and 4

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.