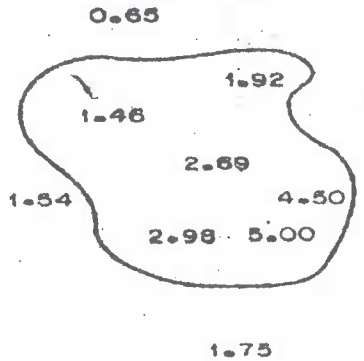
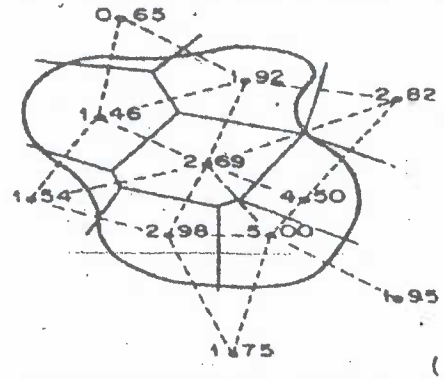
4. MEAN RAINFALL OVER AN AREA



(a)

Arithmetic mean:

$$\frac{1.46 + 1.92 + 2.69 + 4.50 + 2.98 + 5.00}{6} = 3.09 \text{ in.}$$



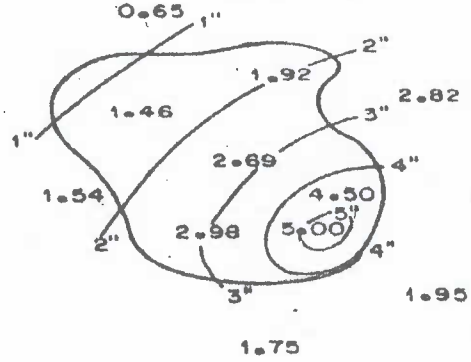
(b)

Thiessen method:

Observed precip. (in.)	Area* (sq mi)	Per cent total area	Weighted precipitation (in.) (col. 1 × col. 3)
0.65	7	1	0.01
1.46	120	19	0.28
1.92	109	18	0.35
2.69	120	19	0.51
1.54	20	3	0.05
2.98	92	15	0.45
5.00	82	13	0.65
4.50	76	12	0.54
	626	100	2.84

Average = 2.84 in.

*Area of corresponding polygon within basin boundary



(c)

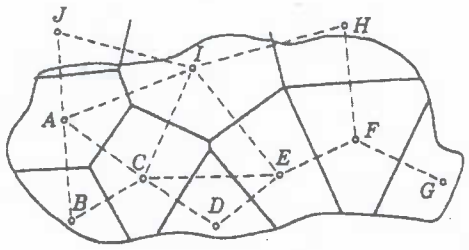
Isohyetal method:

Isohyet (in.)	Area* enclosed (sq mi)	Net area (sq mi)	Avg. precip. (in.)	Precipitation volume (col. 3 × col. 4)
5	13	13	5.3	69
4	90	77	4.6	354
3	206	116	3.5	406
2	402	196	2.5	490
1	595	193	1.5	290
<1	626	31	0.8	25
				1634

Average = 1634 ÷ 626 = 2.61 in.

*Within basin boundary

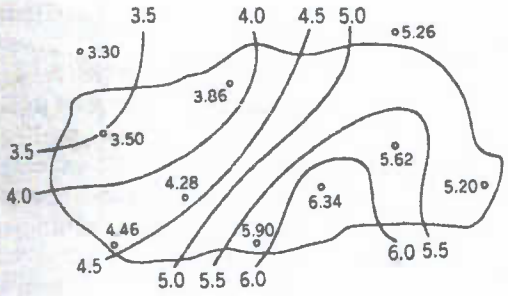
Figure 3-11 Areal averaging of precipitation by (*a*) arithmetic method, (*b*) Thiessen method, and (*c*) isohyetal method.



Station	Thiessen area mi²	Precipitation, in.	Product, mi² in.
A	72	3.50	252
B	34	4.46	152
C	76	4.28	325
D	40	5.90	236
E	76	6.34	482
F	92	5.62	517
G	46	5.20	239
H	40	5.26	211
I	86	3.86	332
J	6	3.30	20
Total	568	47.72	2766

$$\text{Average precipitation} = \frac{\Sigma \text{ Product}}{\Sigma \text{ Area}} = \frac{2766}{568} = 4.87 \text{ in.}$$

FIGURE 2.3
Thiessen network.



Isohyets	Area between isohyets, mi²	Average precipitation, in.	Product $A \times P$ mi² in.
3.0	19	3.45	66
3.5	106	3.75	398
4.0	102	4.25	434
4.5	60	4.75	285
5.0	150	5.25	788
5.5	84	5.75	483
6.0	47	6.20	291
6.5			
Total	568	—	2745

$$\text{Average precipitation} = \frac{\Sigma AP}{\Sigma A} = \frac{2745}{568} = 4.83 \text{ in.}$$

FIGURE 2.4
An isohyetal map.