1 acre = 43560 ft² 1 mi = 5280 ft
1 mi² = 640 acres

Water Balance

$\Delta S = I - Q + P - E - G_w$
Change in storage for a given resevoir size.

convert all units to inches:
- I = Inflow (given in cfs, convert to in.)
- Q = Outflow (given in cfs, convert to in.)
- P = Precipitation
- E = Evaporation
- G_w = Groundwater loss (seepage)

Convert I & Q Ex.:
A = 525 acre
I = 300 cfs
duration = 1 month

$$\frac{30\ \frac{ft^3}{s}\left(\frac{1\ acre}{43560\ ft^2}\right)\left(\frac{12\ in}{1\ ft}\right)\left(\frac{3600\ sec}{1\ hr}\right)\left(\frac{24\ hrs}{1\ day}\right)\left(\frac{30\ day}{mo}\right)\times 1\ mo.}{525\ acre}$$

$I = 40.86\ in$ (Do this for all values then solve ΔS)

Theissen Method

1) draw line to connect all gages. 2) draw perpendicular lines through previous lines 3) Create table to find weighted areas and areal rainfall

P_i	A_i	A_i/A_{TOTAL}	$P_i(A_i/A_T)$
	$\sum$		$\sum_i$ ← answer

Runoff Coefficient

$$\text{Runoff Coeff} = \frac{\text{Runoff}}{\text{Precip}}$$

Given: Area, Precipitation, Duration, Discharge @ outlet
1) Calc. Runoff in inches = $\frac{\text{Discharge} \times \text{Duration}}{\text{Area}}$ = in.
2) Losses = Precipitation − Runoff
3) Calc. Runoff Coefficient

Infiltration Capacity

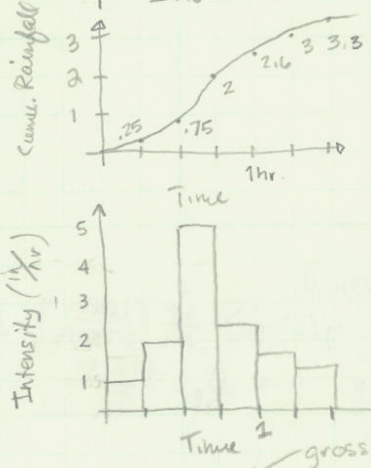
- Hortons equation:

$$f = f_c + (f_o - f_c)e^{-Kt}$$

Given: initial infiltration rate = f_o
final (equilibrium capacity) = f_c
infiltration coeff = K

1) solve for f @ each req'd time interval (make table)
2) to find volume of infiltration, integrate Horton's eq. over desired duration

- ϕ Index:



Given: Rainfall data for specified duration/increments, runoff
1) Plot Cumulative rainfall
determine intensity for each increment & plot hyetograph

	Time (hr)	Grossrainfall
Ex.	0 − 0.25	(0.25 − 0) in / 0.25 hr = 1 in/hr
	0.25 − 0.5	(0.75 − 0.25) in / 0.25 hr = 2 in/hr
	0.5 − 0.75	(2.0 − 0.75) in / 0.25 hr = 5 in/hr
	0.75 − 1.0	(2.6 − 2.0) in / 0.25 hr = 2.4 in/hr
	1.0 − 1.25	(3 − 2.6) in / 0.25 hr = 1.6 in/hr
	1.25 − 1.50	(3.6 − 3.3) in / 0.25 hr = 1.2 in/hr

Watershed = $100\ mi^2\left(\frac{640\ acres}{mi^2}\right)$ = 64000 acres

$$P_{net} = \frac{\text{Direct Runoff (cfs-hr)}}{\text{Area (acre)}}$$ ← to convert cfs-hr to acre-in/hr multiply by 1.008

Pnet = in inches

$P_{net} = D_1\left(\frac{in}{hr} - \phi\right) + D_2\left(\frac{in}{hr} - \phi\right) + \ldots$ → Solve for ϕ and plot value as straight line on hyetograph