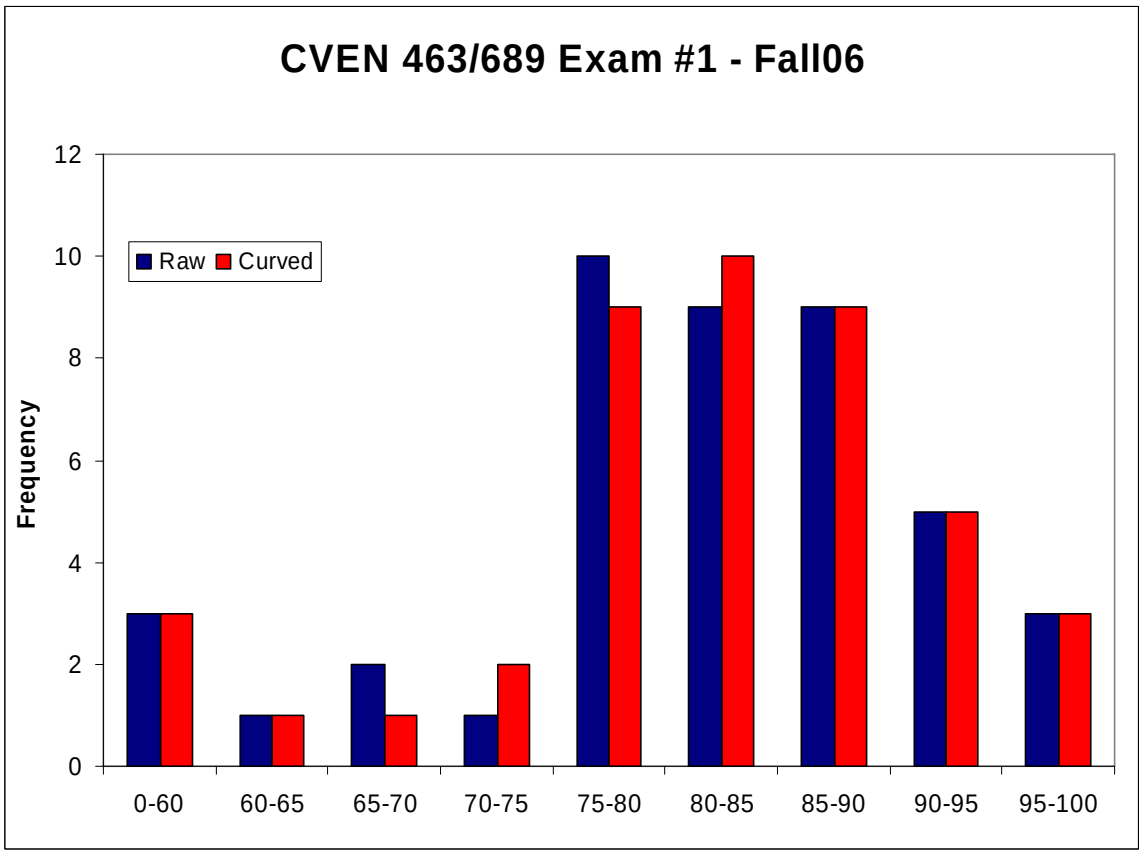
CVEN 463/698 – Midterm Exam #1 – Fall 2006

37 students in 463 section
6 students in 689 section

Statistics for all 43 students:

	Raw	Curved
Median	84	84
Mean	81.8	82.4
St. Dev.	11.3	10.4
High	100	100
Low	52	55.5

Histogram



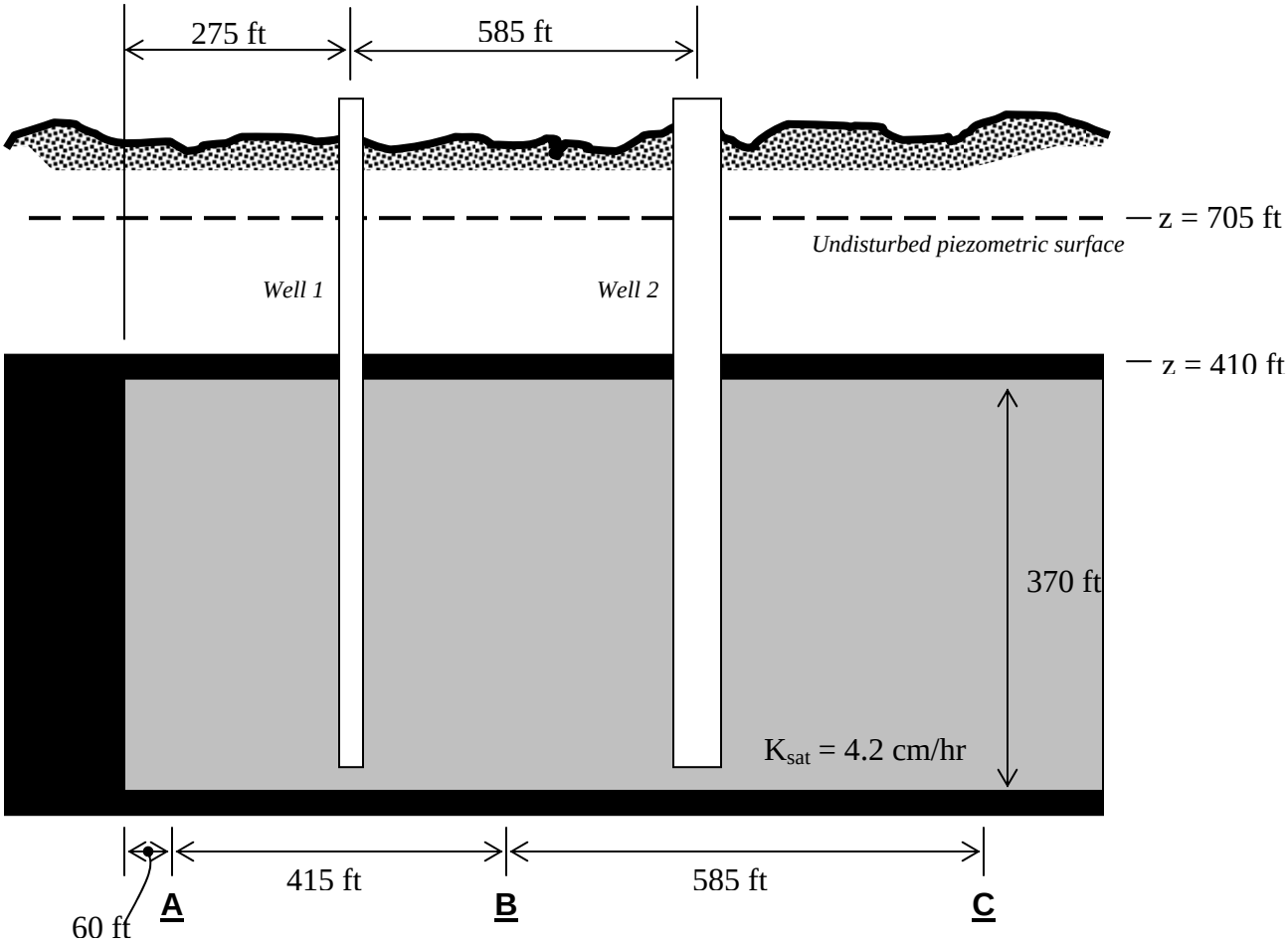
Name: _____

CVEN 463/689 –Engineering Hydrology
Fall Semester 2006
Dr. Kelly Brumbelow, Texas A&M University

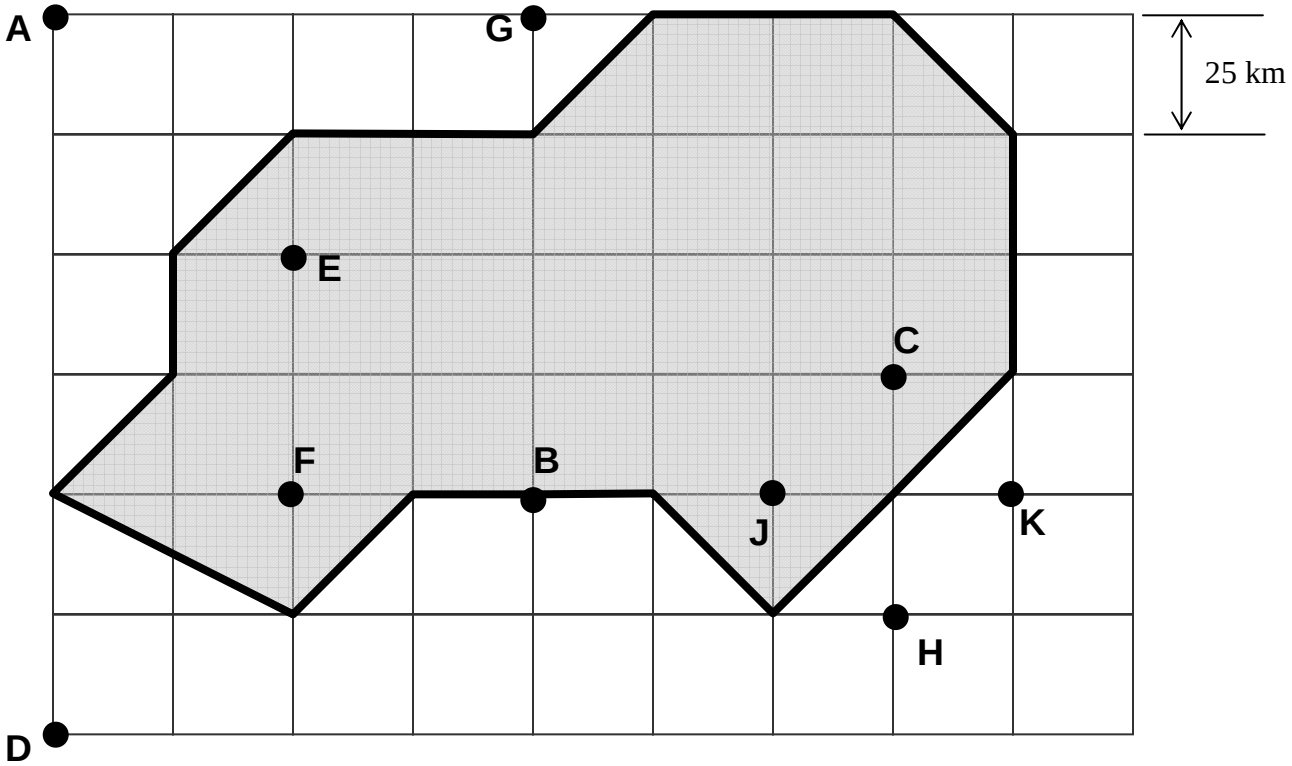
Exam #1

Open-book, Open-notes (time allowed: 80 minutes)

1. Two wells are drilled into a confined aquifer as shown below. The aquifer is bounded by an impermeable formation 275 ft to the left of Well 1. Well 1 is 12 inches in diameter, is pumped at 55 gpm, and has a radius of influence of 525 feet. Well 2 is 18 inches in diameter, is pumped at 80 gpm, and has a radius of influence of 800 feet. What will be the final steady-state elevation of the piezometric surface at: (a) Point A, (b) Point B, and (c) Point C? (25 points)



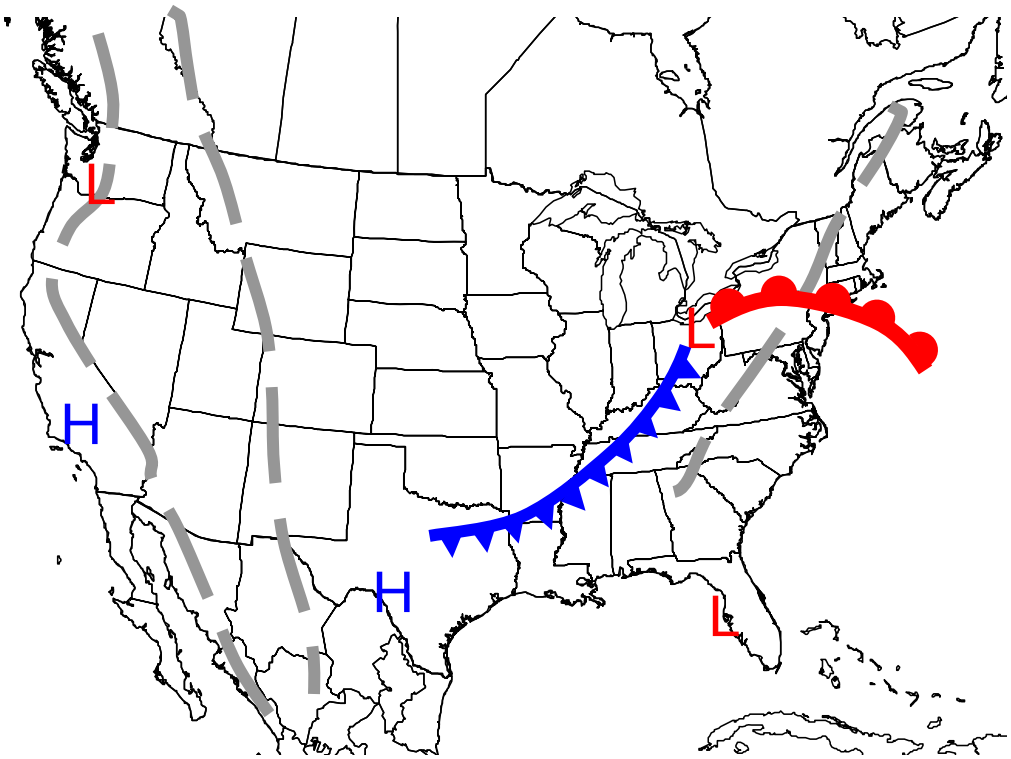
2. Shown below is a map of the Camus River watershed and a network of raingages in and near the watershed. The table presents rainfall totals for a recent storm at each raingage. What is the mean areal precipitation for this storm on the Camus watershed? (30 points)



Gage	Precip. (mm)	Gage	Precip. (mm)
A	0	F	19
B	35	G	21
C	74	H	98
D	7	J	91
E	12	K	102

3. Given below is a basic weather map for North America for a day in early August. Significant mountain ranges are shown on the map with the broad dashed lines. There would likely be at least 4 locations experiencing precipitation on this day from a variety of precipitation mechanisms.

(a) Indicate on the map where precipitation would be occurring.
(b) For each location marked above, specify the precipitation mechanism at work, and state whether the precipitation would be (i) gradual or intense, and (ii) short- or long-lived. (20 points)



4. A reservoir experiences direct precipitation (i.e., precipitation falls on the lake surface), evaporation, stream inflow, and outflow through a dam as shown in the table below. Also given is the uncertainty in each of these parameters expressed as a percentage above and below the expected values given; for each parameter, it is equally likely that the actual value is anywhere within the given range. The surface area of the reservoir is known to be 100 mi^2 (no uncertainty in this value).

(a) Write a water balance equation for this reservoir, and determine the expected change in storage in 1 year (express your answer in acre·feet).
(b) Determine the uncertainty on the expected change in storage determined in (a) as a range of percentage above and below the expected value. {Hint: Solve for the change in storage assuming all parameters are at their limits to bias the value downwards, and then solve assuming all parameters at their limits to bias the value upwards.}
(c) Determine which inflow or outflow parameter has the greatest contribution to the uncertainty in the expected value of the change in storage. What fraction of the total uncertainty is due to this most influential parameter. E.g., if the uncertainty on the storage change is ± 7%, you might find that the parameter contributing most to the uncertainty is responsible for ± 4.2%. (25 points)

Parameter	Expected Value	Uncertainty
Direct Precipitation	32.35 in/yr	± 5.30 in
Evaporation	0.09 in/day	-25 % to +30%
Inflow	903,000 ac·ft/yr	-12% to +19%
Outflow	1200 cfs	± 4.4%