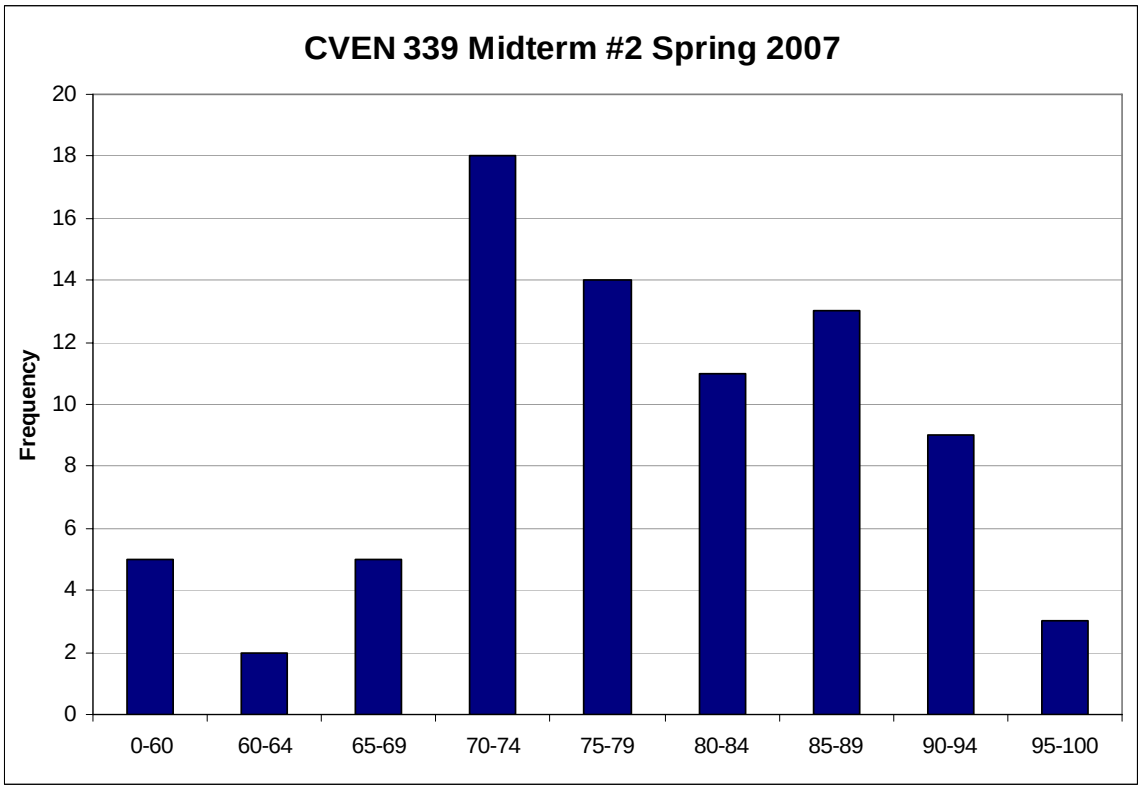
CVEN 339 – Midterm Exam #2 – Spring 2007

80 Students

Median	78
Mean	78.2
St. Dev.	10.2
High	100
Low	55

Histogram:



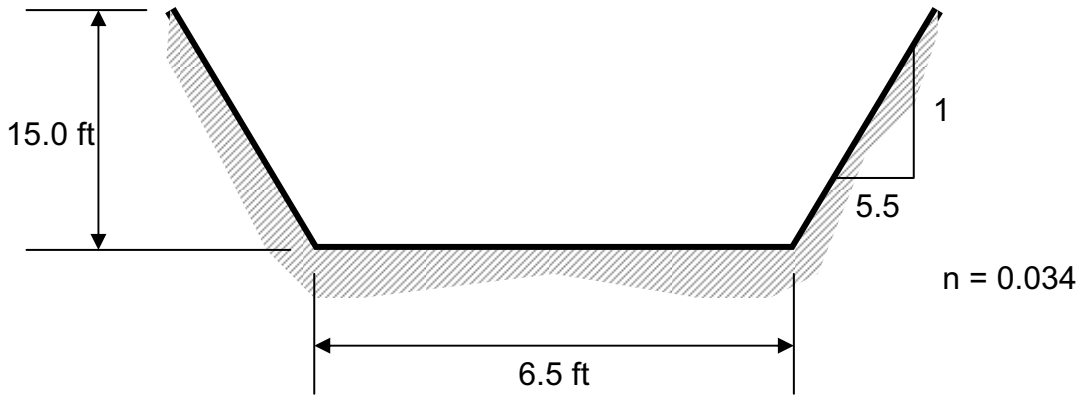
Name: _____

CVEN 339 – Water Resources Engineering
Spring Semester 2007
Drs. Kelly Brumbelow and Anthony Cahill, Texas A&M University

Exam #2

Open-book, Open-notes (3 pages, 2 questions); Time allowed: 60 minutes

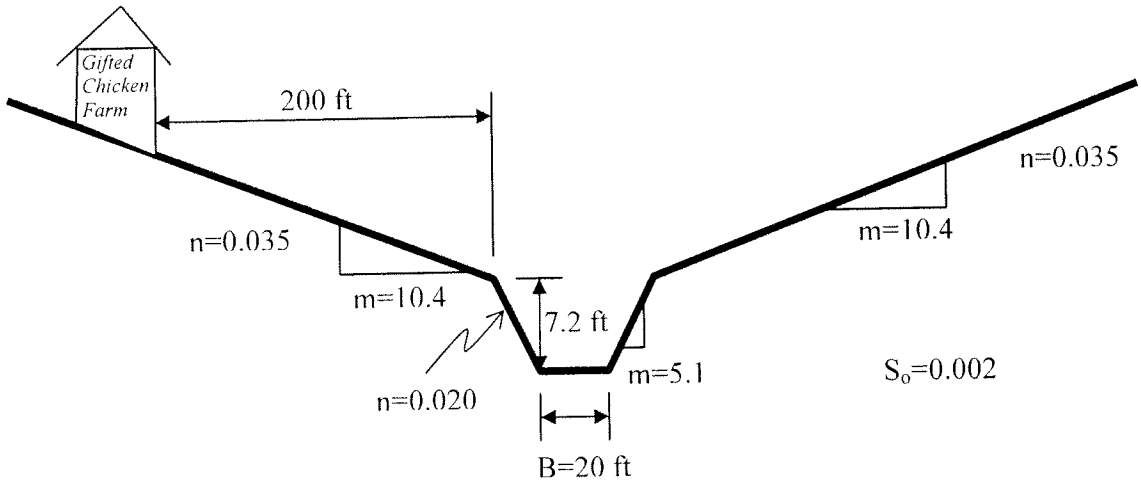
1. You are designing an earthen drainage channel that must carry a peak flow of 305 cfs. In your site visits you have determined that the soil forming the channel bed is a sandy clay. A geotechnical engineer accompanying you looked at the soil, agreed with your description, and also described it as being "very compact." The channel will have the cross-sectional geometry shown below. *What is the maximum allowable longitudinal bed slope for the channel, for which there will be no erosion problems?* (35 points)



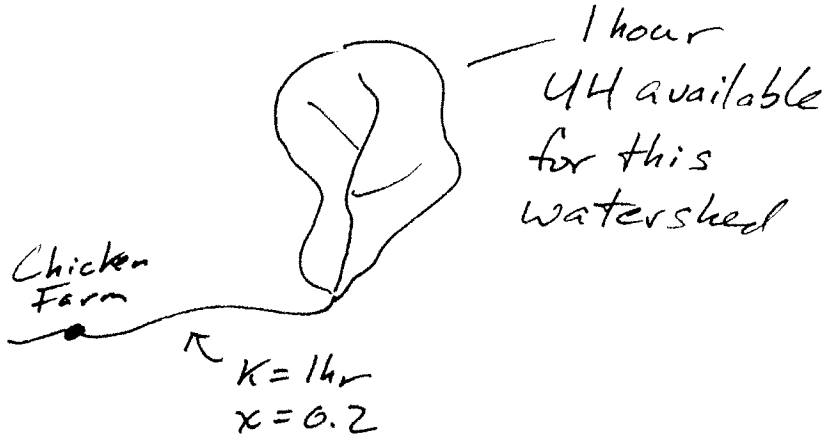
Problem 2 (65 points)

As we all know, Dr. Brumbelow's chicken farm is located on a stream, so he is always concerned about floods, and needs your help to develop a flood warning system. The stream originates in a watershed above the chicken farm. The chickens have developed a 1-hour unit hydrograph for this watershed, given on the next page. The chickens have also derived the Muskingum routing coefficients for the stretch of river between the mouth of the watershed (where the unit hydrograph is measured) and the farm location – **K = 1 hour, x = 0.2** (they're smart chickens!) Unfortunately, Dr. Brumbelow bought a 2 hour rain gage for the watershed – it can only provide the amount of rain that falls in a two hour storm.

Given the unit hydrograph, the Muskingum routing coefficients, the channel geometry at the farm location, and Manning's equation, and a baseflow of 0 cfs, what is the maximum two hour rainfall that can occur without flooding the chickens? Remember that the unit hydrograph is a linear procedure, and with no baseflow, Muskingum routing is a linear procedure too.



Drawing not to scale.
The channel is symmetric about its center.



t (hr)	1 hour UH (cfs flow/in of rainfall)
0	0
1	10000
2	20000
3	15000
4	10000
5	5000
6	0