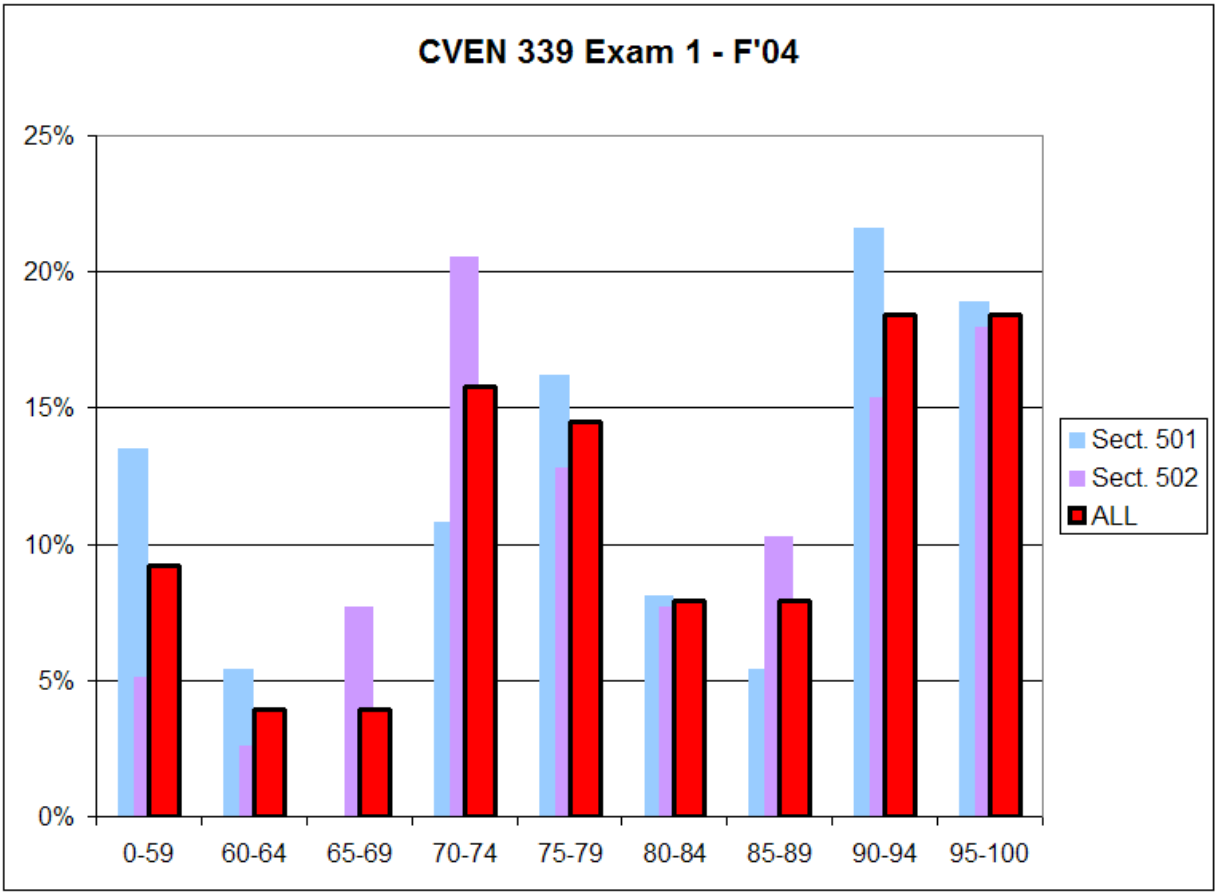
CVEN 339 Exam #1 Grades – No curve applied.

Section 501:
Median 82
Mean 79.6
Std. Dev. 17.4
High 100 (2)

Section 502:
Median 80
Mean 81.3
Std. Dev. 13.1
High 100 (4)

ALL:
Median 80.5
Mean 80.5
Std. Dev. 15.3
High 100 (6)

Histogram of Scores:



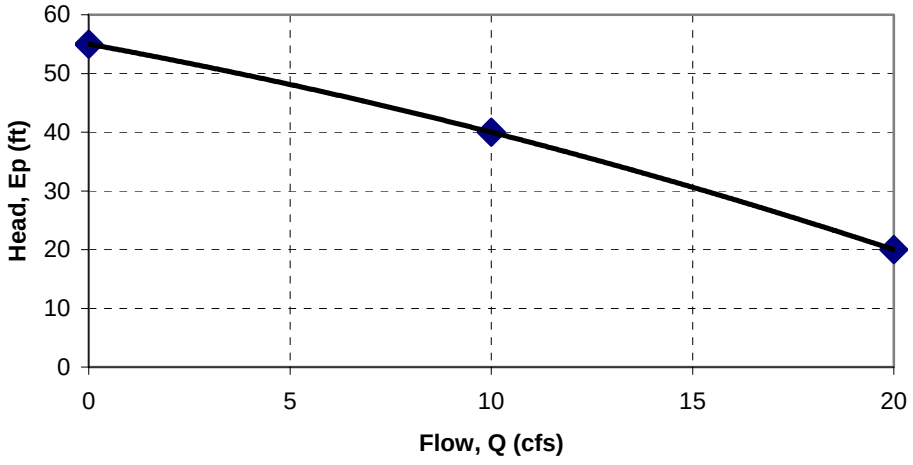
Name: _____

CVEN 339 – Water Resources Engineering
Fall Semester 2004
Dr. Kelly Brumbelow, Texas A&M University

Exam #1

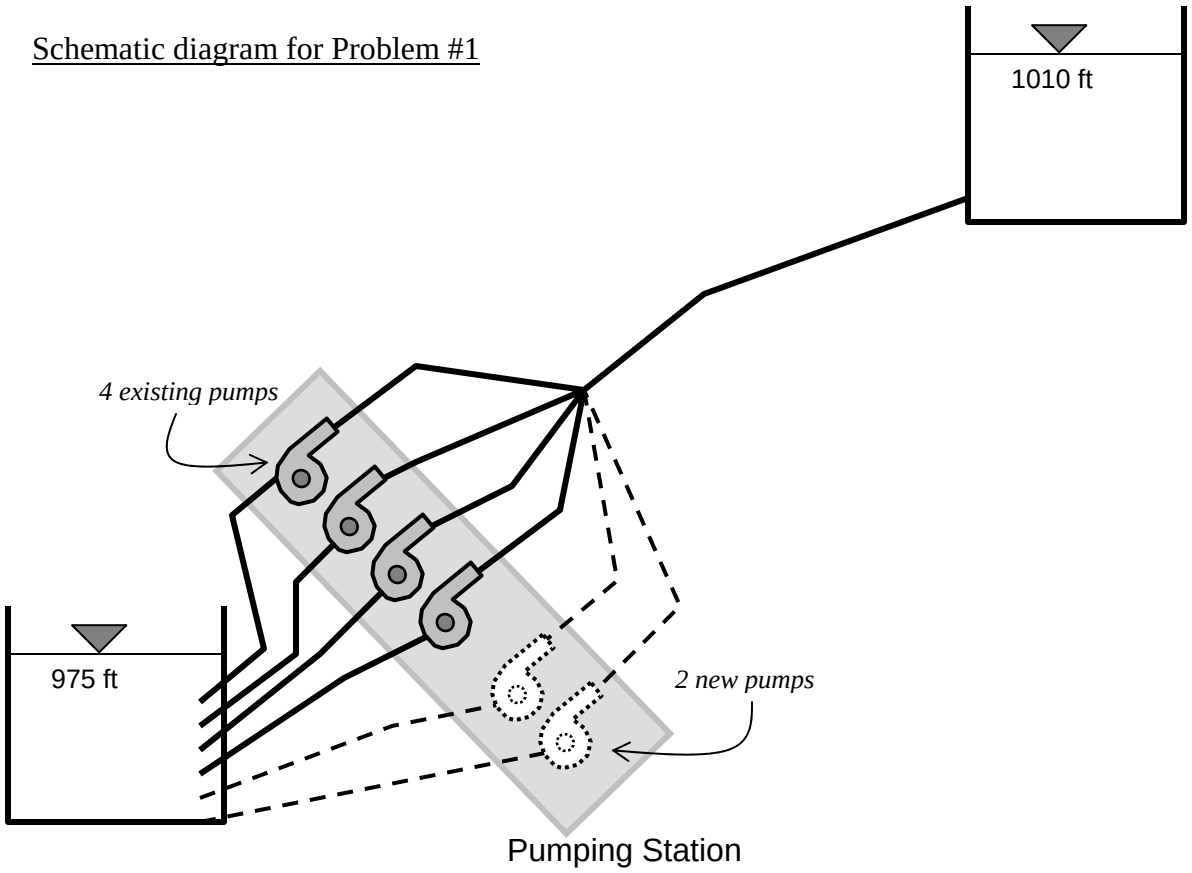
Open-book, Open-notes (6 pages, 2 questions)

1. You are a staff engineer for a water supply district. One day your boss comes running into your office out of breath and screaming. He's forgotten until now that he must make a presentation to the district's board of directors in an hour on a planned expansion of a pumping station. The station takes water out of a reservoir and pumps it into a long pipeline to a second reservoir several miles away. The first reservoir's water surface elevation is 975 ft msl (above mean sea level), and the second reservoir's water surface is at 1010 ft msl. Currently the pump station has 4 identical pumps that operate in parallel. The planned expansion will add 2 more pumps. With the short time that you have available, you locate the pump characteristic curve (i.e., for a single pump) shown below. You also look at recent data and find that the average flowrate through the pipeline is 29.7 cfs. You do not have enough time to look up data on the pipeline length, diameter, valves, etc. Your boss needs you to determine: *"What will be the flowrate in the pipeline after expansion of the pumping station from 4 to 6 pumps?"*
{Hint: The relevant data about pipeline length, diameter, roughness, etc., that you don't have time to find is contained in the "system curve" K_{eq} parameter, which can be determined from given information.}
(50 points)



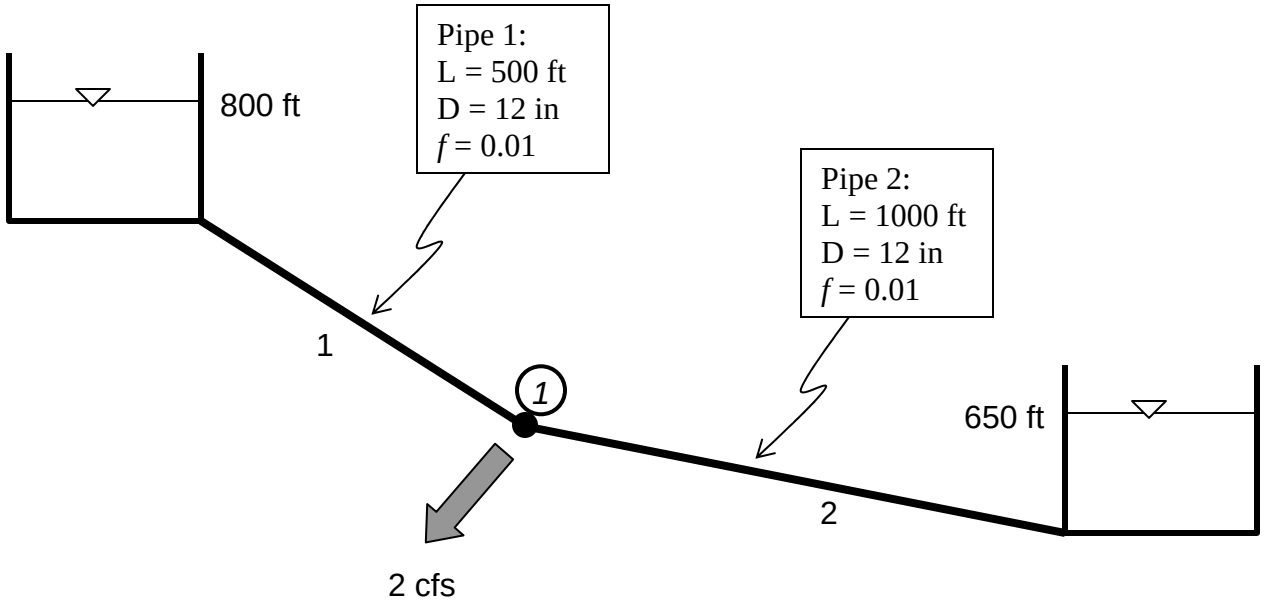
{See schematic diagram on next page}

Schematic diagram for Problem #1



(Work space for #1)

2. Shown in the diagram below is a 2-segment pipeline connecting an upper reservoir to a lower reservoir. At the junction of the two segments is a node where water is withdrawn at a rate of 2 cfs. *Using the Linearized Equation method, set up a system of equations to solve for flow in the two pipeline segments. Then, starting from an assumed flow of 1 cfs in each segment, perform <u>1 iteration</u> of the solution algorithm.* To save time you may consult the next page for several pre-solved matrix inversions.
(50 points)



MATRIX	INVERSE(MATRIX)
[-1 1 ; 0.198 0.395]	[-0.666 1.686 ; 0.334 1.686]
[1 -1 ; 0.198 0.395]	[0.666 1.686 ; -0.334 1.686]
[-1 1 ; -0.198 -0.395]	[-0.666 -1.686 ; 0.334 -1.686]
[1 -1 ; -0.198 -0.395]	[0.666 -1.686 ; -0.334 -1.686]
[-1 1 ; -0.198 0.395]	[-2.005 5.076 ; -1.005 5.076]
[-1 1 ; 0.198 -0.395]	[-2.005 -5.076 ; -1.005 -5.076]
[1 -1 ; -0.252 -0.504]	[0.667 -1.323 ; -0.333 -1.323]
[1 -1 ; 0.252 0.504]	[0.667 1.323 ; -0.333 1.323]
[-1 1 ; -0.252 -0.504]	[-0.667 -1.323 ; 0.333 -1.323]
[-1 1 ; 0.252 0.504]	[-0.667 1.323 ; 0.333 1.323]
[1 -1 ; -1.01E-06 -2.02E-06]	[0.667 -330033.003 ; -0.333 -330033.003]
[-1 1 ; -1.01E-06 -2.02E-06]	[-0.667 -330033.003 ; 0.333 -330033.003]
[1 -1 ; 1.01E-06 2.02E-06]	[0.667 330033.003 ; -0.333 330033.003]
[-1 1 ; 1.01E-06 2.02E-06]	[-0.667 330033.003 ; 0.333 330033.003]

(Work space for #2)