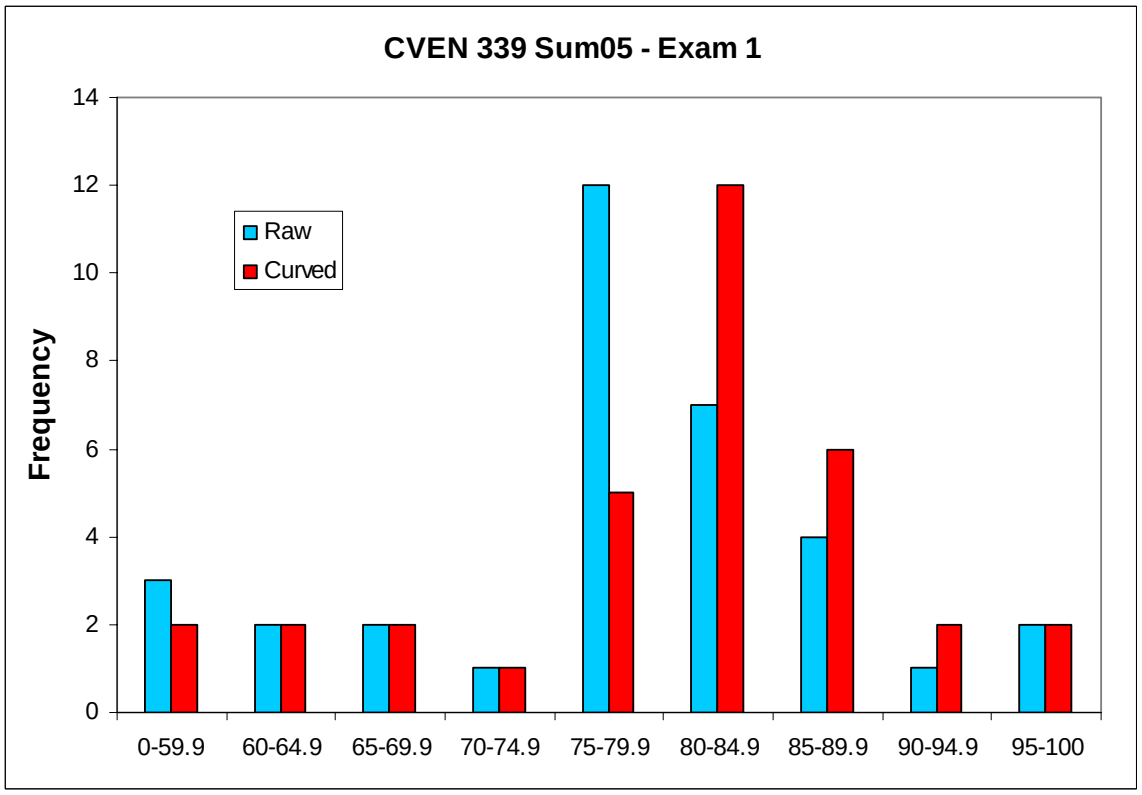
CVEN 339 – Summer 2005 – Exam #1

90 minutes allowed

	Raw	Curved
Median	78	80
Mean	76.9	79.9
Std. Dev.	10.6	10.6
High	96	99



Name: _____

CVEN 339 – Water Resources Engineering
Summer Semester 2005
Dr. Kelly Brumbelow, Texas A&M University

Exam #1

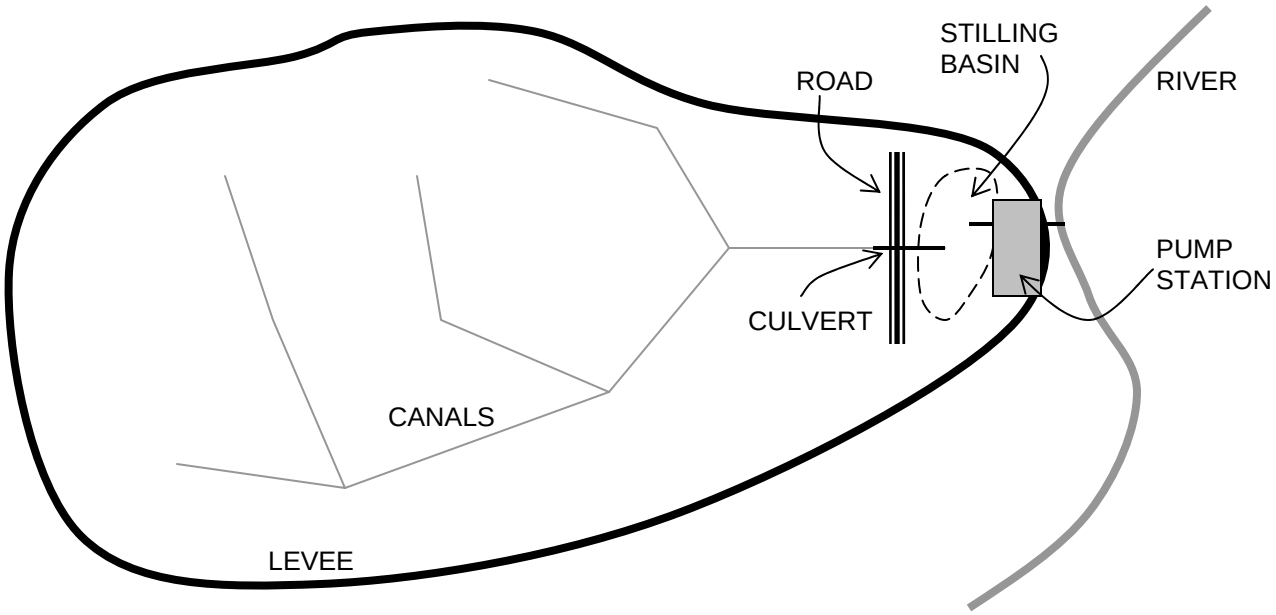
Open-book, Open-notes (7 pages, 2 questions); Time allowed: 90 minutes

1. A city in a coastal area is completely surrounded by a flood protection levee. Since this levee can also keep water inside the city, an internal drainage canal network has been constructed that carries internal floodwater to a pump station. This internal floodwater is then pumped over the encircling levee to an adjacent river. (See the map below).

Immediately before water enters the stilling basin at the pump station's inlet, it flows through a culvert built in a road embankment. Planning studies are underway to assess the internal drainage infrastructure, and there is a question as to whether the culvert or the pump station is currently the limiting factor in the existing infrastructure (i.e., is flow most limited by the culvert or the pump station?).

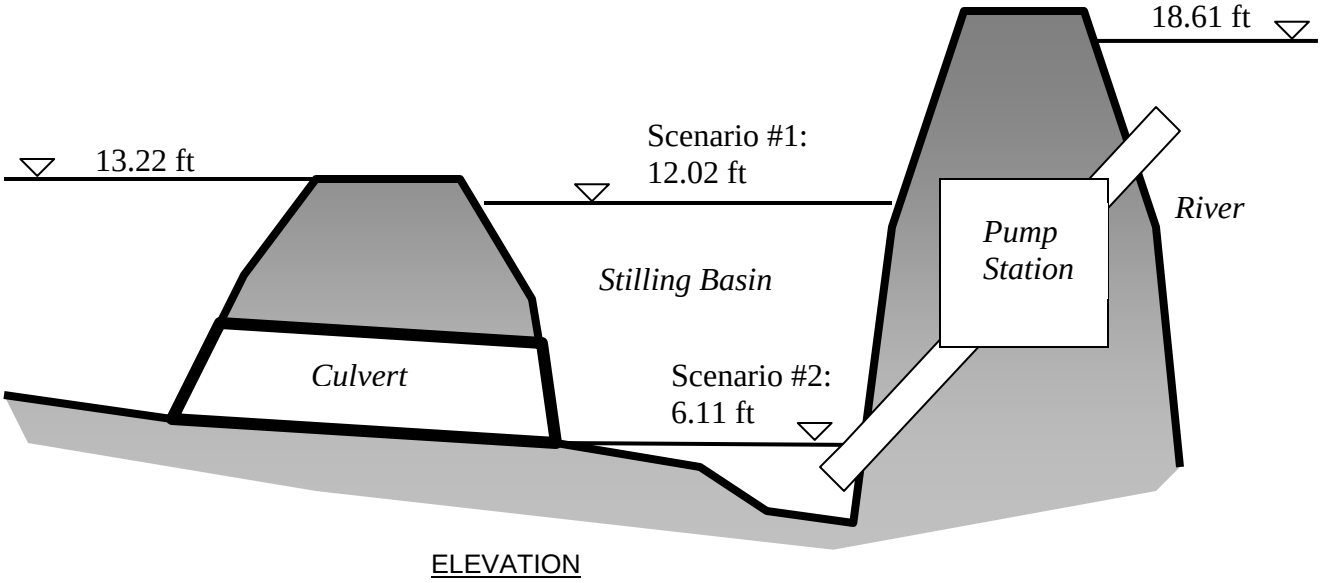
(a) For the two scenarios shown in the elevation drawing on the next page, is the culvert or the pump the limiting element for removing internal floodwater?
(b) What measure(s) could be taken to increase the capacity of this system to remove floodwater from inside the levee under each scenario?

(60 points)



MAP

Elevations shown are feet
above mean sea level

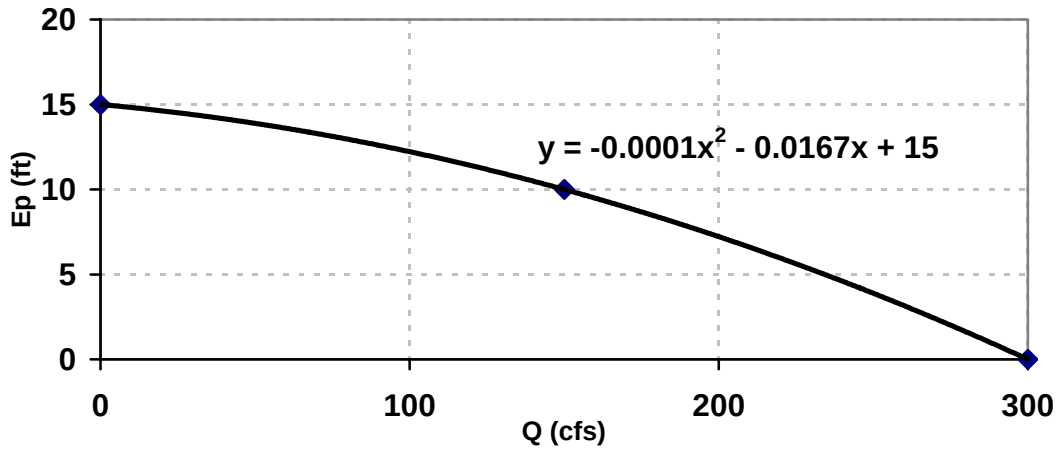


ELEVATION

Culvert Properties:
Diameter 36 inches
Length 145.5 ft
Reinforced concrete, ε = 1.2 mm
Mitered entrance and exit
Entrance invert elevation 7.61 ft msl
Exit invert elevation 6.24 ft msl

Pump/pipeline Properties:
Diameter 18 inches
Length 257.9 ft
Welded steel, ε = 0.045 mm
Projecting entrance and exit
Entrance invert elevation 4.20 ft msl
Exit invert elevation 14.51 ft msl

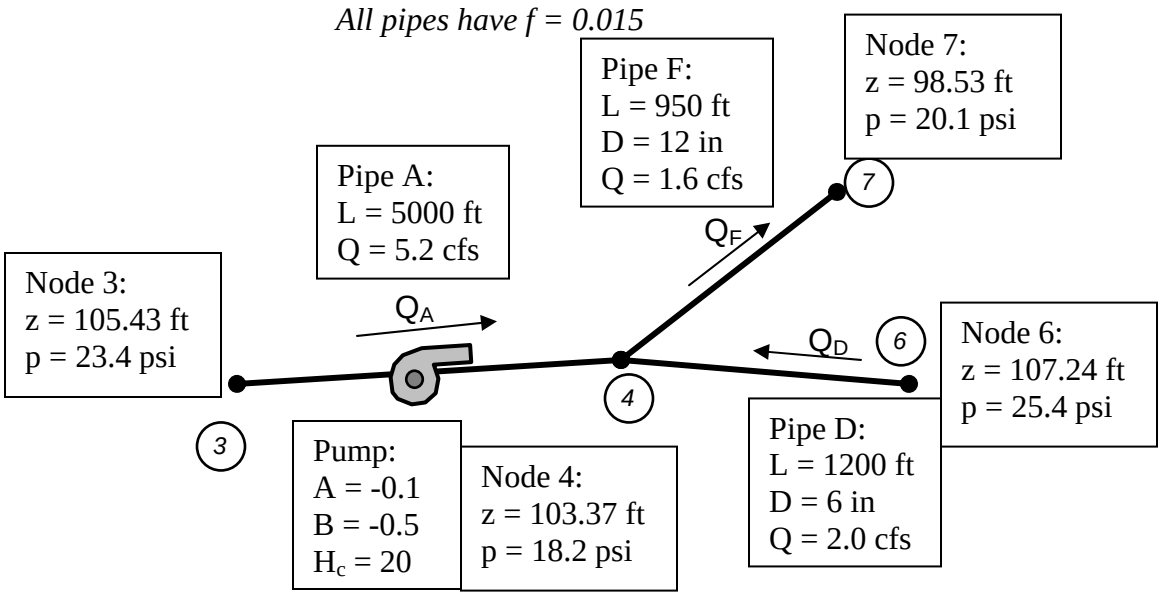
Pump characteristic curve:



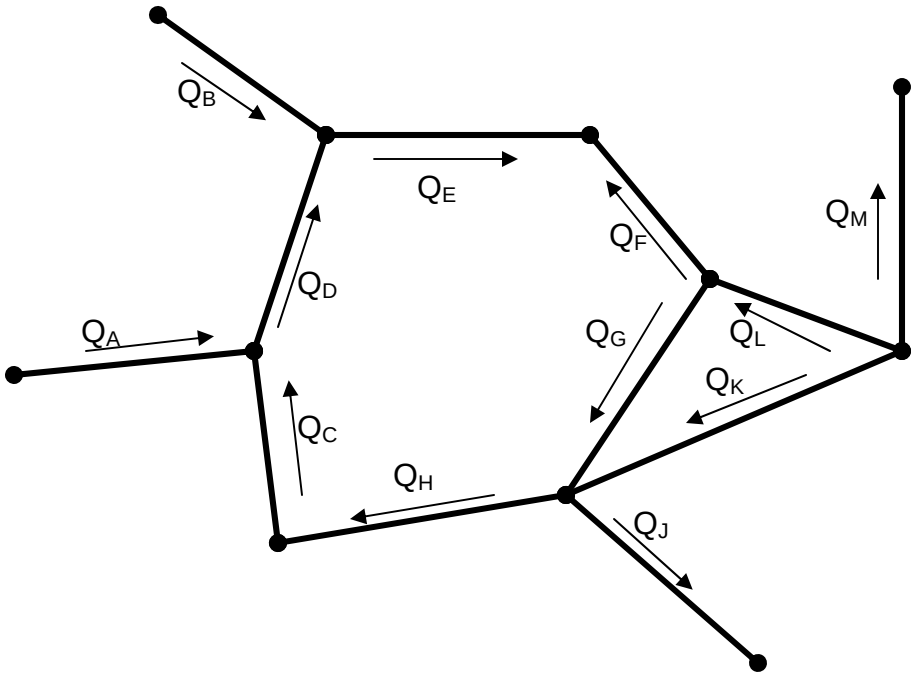
2. You are reviewing the results of computer modeling of a city's water distribution network. You suspect that there might be errors in the results. Shown below are two excerpts from these results. Based on the information shown for each case, state whether the results are *Feasible* (could be correct, even if you're not sure that it is) or *Infeasible* (definitely not correct). Justify your answers. (Since node demands are not known with certainty, you should not reject a solution if a positive node demand could exist and satisfy continuity at a given node).

(40 points)

(a)



(b)



Pipe	Flow (cfs)
A	2.5
B	-3.0
C	1.2
D	3.7
E	0.7
F	-0.7
G	2.7
H	1.2
J	2.6
K	1.1
L	2.0
M	-3.1