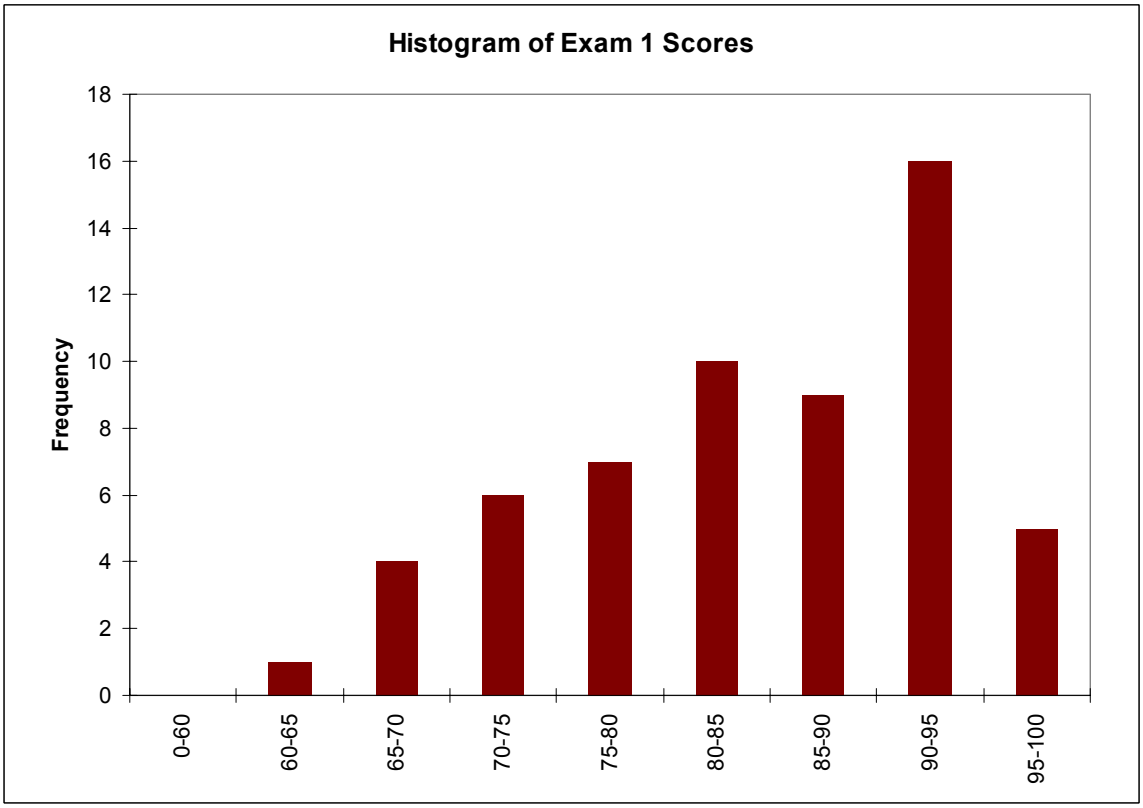
CVEN 339 – Exam #1 – Spring 2003

Grade Statistics

Median	85.9
Mean	84.6
Std. Dev.	8.8
Maximum	98
Minimum	64.8



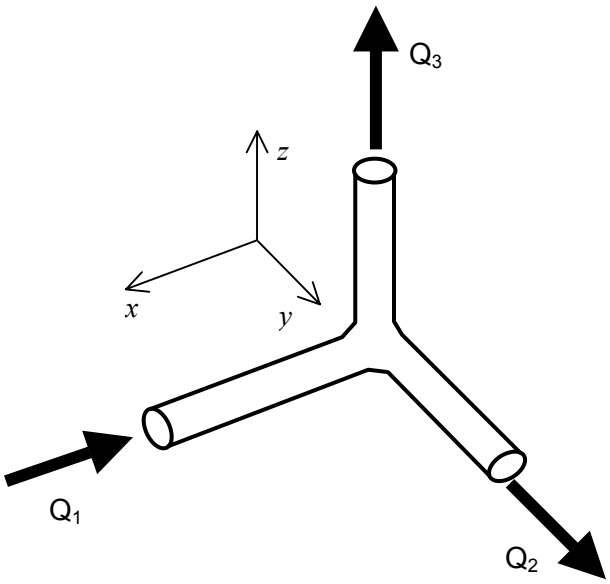
Name: _____

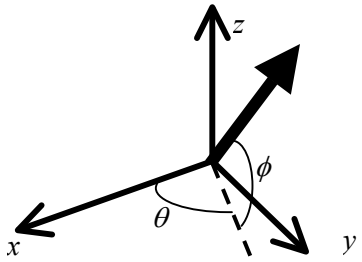
CVEN 339 – Water Resources Engineering
Spring Semester 2003
Dr. Kelly Brumbelow, Texas A&M University

Exam #1

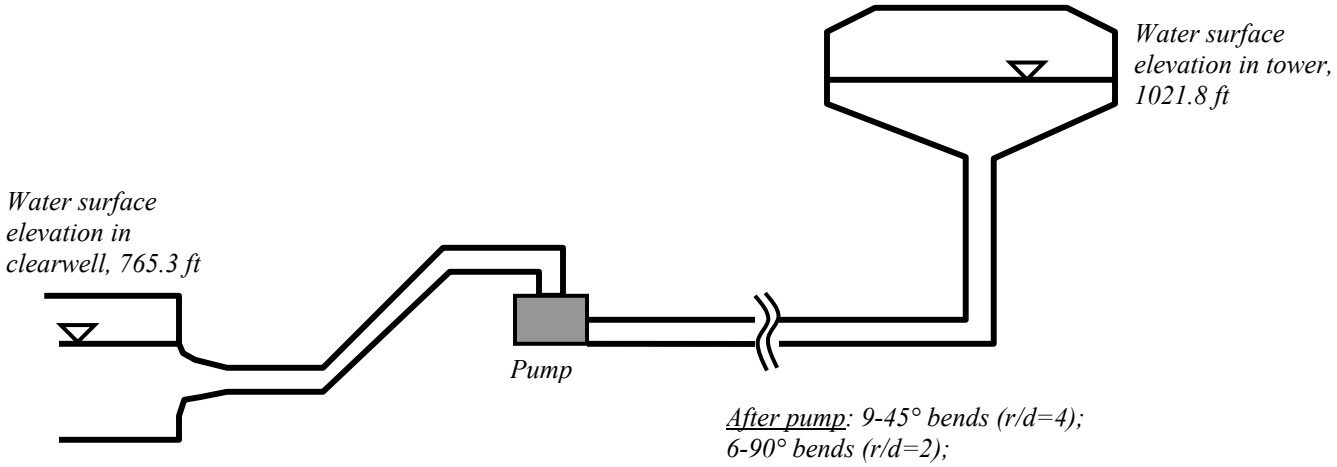
Open-book, Open-notes (5 pages, 3 questions)

1. A pipe fitting is drawn below. All pipe diameters in the fitting are 6 inches. Relative to the axes shown, flow enters the fitting only from the branch extending in the *x*-direction, and flow leaves the fitting through the branches extending in both the *y*- and *z*-directions (Q_2 = 3.6 cfs, Q_3 = 2.7 cfs). What will be the force (direction and magnitude) that a thrust block would exert to hold the fitting in place? To determine force direction in 3 dimensions, use angles θ and ϕ as shown in the figure at right. (25 points)



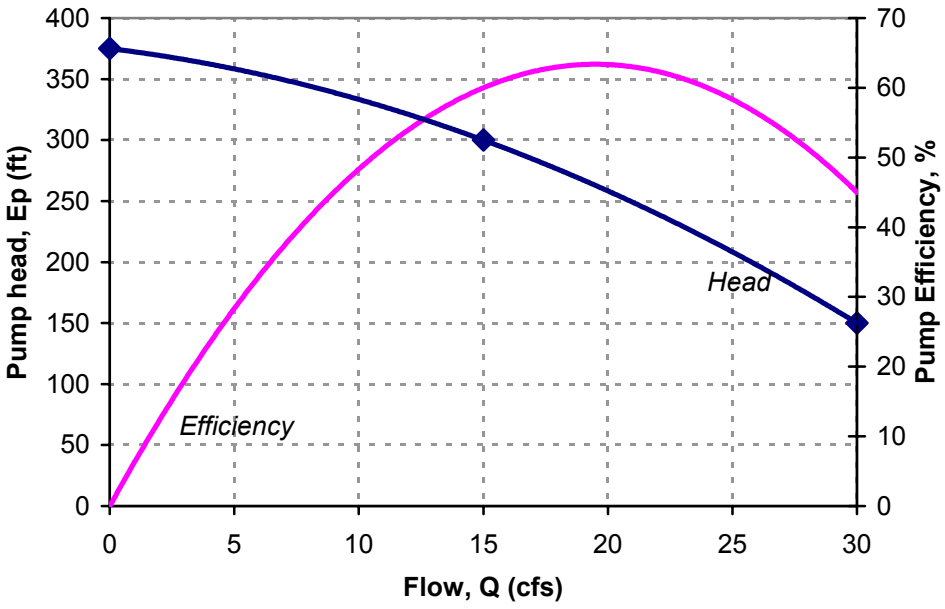


2. A pump has the characteristic and efficiency curves given below for a single-stage. If it is to be used to pump water from a water treatment plant clearwell to an elevated storage tank as shown in the diagram below, what will be the flowrate through the system? What will be the power consumption of the pump motor in horsepower if the motor efficiency is 65%? Be sure to include minor losses in your calculations. (45 points)



Rounded entrance from clearwell to pipe;
<u>Before pump</u>: 2-45° bends (r/d=4);
1-90° bend (r/d=2);
155 ft pipe, 36 in diameter, asphalted iron

<u>After pump</u>: 9-45° bends (r/d=4);
6-90° bends (r/d=2);
4250 ft pipe, 36 in diameter, asphalted iron



3. Write the equations necessary to solve for flows in the pipe network shown below. Write definitions for *all* terms used in the equations, using the dummy variable *i* for repeated and numbered items. For example, if you use $K_2Q_2^2$, $K_3Q_3^2$, etc., you may state "$K_i = X_i / Y_i$" and so on as appropriate. Assume that all nodes have demands associated with the nodes. Be sure to indicate your assumed flow directions. (30 points)