Design Considerations

- Inlet of tank had negligible height
- Whole Discharge pipe (pipe-elbows-valve system)
- System in equilibrium (Force = 0)

Data and Variables

Volumetric Flow Rate	Q = 5.081 ft^3/s
Velocity	V = 14.6 ft/s
Change in Pressure	ΔP
Density of Water	ρ_w = 62.4 lb/ft^3
Area	A= 0.3472 ft^2
Gravity	g = 32.2 ft/s^2
Pump Head	hA= 260 ft
Energy loss due to friction	hL= $h_{L_{sution}} + 3 \cdot h_{L_{elbows}} + h_{L_{valve}} + h_{L_{disrchage}}$
Reynolds Number	Re= 802397
Friction Factor	f= 0.0152
Friction Coefficient	fT= 0.014
Length Suction	11 ft
Length Discharge	2500 ft

Procedure

1. First I made a FBD of the forces and reaction acting on the pipe and wrote out Bernuolli's equation.

2. Then I calculated the new hL with the appropriate fittings and valve losses and calculated P3 using Bernoulli's.
3. Using our P3, I derived the equations from Newton’s first law to get Rx and Ry.

Calculations