ES4-P3

February 16, 2025

```python
[9]: # ES4 Problem 3
     # Apply Bernoulli's
     head_a = 30 + 0 # elevation + pressure (arbitrary)
     head_b = 20*144/62.4  # pressure_a + added pressure (given)
     #print(head_a)
     #print(head_b)
     head_loss = head_b - head_a # implies flow uphill
     print(head_loss)
```

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16.153846153846153
```

```python
[16]: # Swamee-Jain Diameter Discharge

      def qJain(diameter,headloss,gravity,length,roughness,viscosity):
          import math
          sqs=math.sqrt(gravity*headloss/length)
          temp1 = roughness/(3.7*diameter)
          temp2 = 1.78*viscosity/(sqs*diameter**(3/2))
          temp3 = math.log10(temp1+temp2)
          qJain = -2.22*(diameter**(5/2))*sqs*temp3
          return qJain

      viscosity = 1.41e-05 # table lookup (http://54.243.252.9/cgi-bin/fluidmechanics/
       ↪WaterPropertiesUS/WaterPropertiesUS.py)
      roughness = 0.0000167 # table lookup (http://54.243.252.9/cgi-bin/Databases/
       ↪RoughnessHeight/RoughnessHeight.py)
      headloss = 16.154 # ft
      length = 3*5280 # miles
      diameter = 2 # feets
      gravity = 32.2
      discharge = qJain(diameter,headloss,gravity,length,roughness,viscosity)
      print("Discharge = ",round(discharge,3)," CFS ")
```

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Discharge =  9.764  CFS
```

```python
[ ]:
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