SG of mercury	13.6
Water Density, lbm/ft3	62.3
gc, lbm ft/=lbf s2	32.2
1ft2 to in2 multiply by	144
Cv	0.62
V1,ft/s	1
D2/D1	0.520524
V2,ft/s	3.690788
Pressure Difference	2.999996

5.41 This is simplest by trial and error. First

$$V_2 = V_1 \cdot \left(\frac{D_1}{D_2}\right)^2 = 1\frac{\text{ft}}{\text{s}} \cdot \left(\frac{1}{0.5}\right)^2 = 4\frac{\text{ft}}{\text{s}}$$ a

$$-\Delta P = \left(1 - \left(\frac{D_2}{D_1}\right)^4\right)\frac{\rho}{2} \cdot \left(\frac{V}{C_v}\right)^2$$

$$= (1 - 0.5^4)\frac{13.6 \cdot 62.3\frac{\text{lbm}}{\text{ft}^3}}{2} \cdot \left(\frac{4\frac{\text{ft}}{\text{s}}}{0.6}\right.$$

Excell is powerfull in solving problems by optimizing the
Data and you will see solver on the right. Click on solve
enter the cell which contains the formula you want to fir
corresponding to the best value of the parameter you w
cell B7. Press Solve and this will give you the final answ
the ratio D2/D1 that will make the pressure drop equa
example. See below. Fter you run the solver you will ge
pressure difference is approximately 3. You can use
h

SG of mercury
Water Density, lbm/
gc, lbm ft/=lbf s2
1ft2 to in2 multiply b
Cv
V1,ft/s
D2/D1
V2,ft/s
Pressure Difference

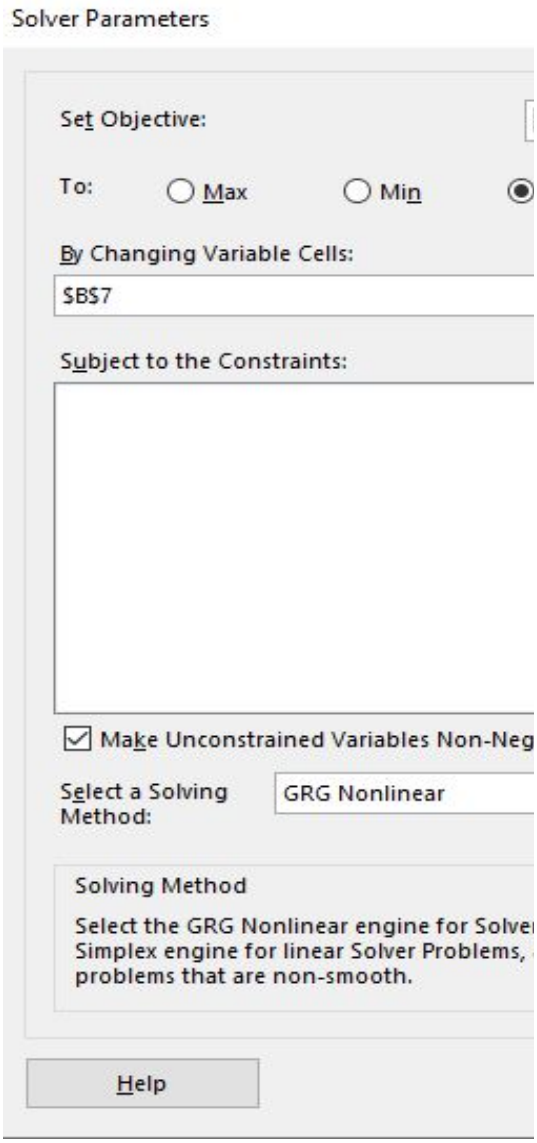
we guess that $D_2 / D_1 = 0.5$. Then

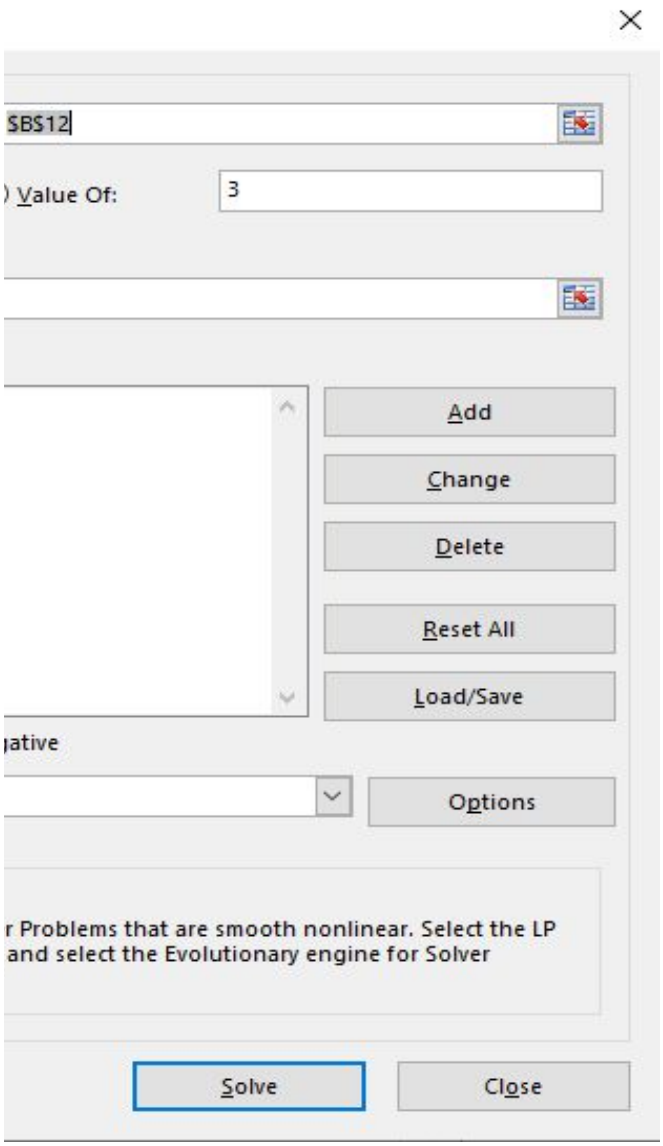
nd

$$\left(\frac{t}{2}\right)^2 \cdot \frac{\text{lbf s}^2}{32.2\ \text{lbm ft}} \cdot \frac{\text{ft}^2}{144\ \text{in}^2} = 3.57 \frac{\text{lbf}}{\text{in}^2}$$

: solution using the Solver which is found in **DATA.** So Click on
r and you will see the screen on the right. In th **set Objective**
ıd an optimum solution(in our case the formula is in cell B12)
ant to optimize (in our case the ratio D2/D1 which is placed in
ers in cell B7 and B12. In Cell B7 you will get the best value of
l 3.Note that at the start we guess a value for D2/D1 , 0.4 for
t the results on the left. The ratio is approximately .5 and the
this and change the values in Cells B1 to B6 and see what
appens.

	13.6
ft3	62.3
	32.2
ɔy	144
	0.62
	1
	0.4
	6.25
	9.046749




B12
Value Of:
3
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ative
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r Problems that are smooth nonlinear. Select the LP
and select the Evolutionary engine for Solver
Solve
Close