# CHEN3600 – Computer-Aided Chemical Engineering Spring 2012

# Chemical Engineering Department Lab 2

**T.D. Placek Auburn University**

 **Lab 2 – Problem Solving Practice**

Problem Statement: We are considering an alley that has high walls on both the left and right sides. There are two ladders positioned in the alley as shown. One ladder is 10 ft long and the other is 12 ft long. When viewed from the end of the alley, the ladders seem to cross 3 ft above the ground. How wide is the alley?

L11

L21

H1

H2

a

b

w

Employ the problem solving methodology discussed in class on Tuesday including the list of variables, numbered equations, and number of variables. Recall that the “driven by need method” (DBN) will direct you to the equations necessary to solve the problem. You may or may not be able to solve the resulting equations. You may use MATLAB or your calculator if necessary. YOU MAY NOT SEARCH FOR A SOLUTION OR ANY HELP ON THE WEB.

Solution to Lab 2

|  |  |  |
| --- | --- | --- |
| **Vars** | **#Vars** | **#Eqns** |
| ~~w~~ | ~~3~~ | ~~1~~ |
| ~~H1~~ | ~~5~~ | ~~2~~ |
| ~~L1~~ | ~~6~~ | ~~3~~ |
| ~~h~~ | ~~7~~ | 4 |
| ~~b~~ | 8 | ~~5~~ |
| ~~a~~ |  | ~~6~~ |
| ~~H2~~ |  | ~~7~~ |
| ~~L2~~ |  | 8 |

Find w, width of alley.

Therefore we need an expression involving w.

$w^{2}+ H\_{1}^{2}=L\_{1}^{2}$ (1) P. Theorem

Check off w and write expression for either H1 or L1 (DBN). v=3, e=1

H1/w = h/b (2) Similar triangles

Check off H1 and write expression for either L1, h, or b (DBN). v=5, e=2

L1 = 12 (3) Given

Check off L1 and write expression for either h or b (DBN). v=5, e=3

w = a + b (4) Sum of parts equals whole

Check off b and write expression for either h or a (DBN). v=6, e=4

H2/w = h/a (5) Similar triangles

Check off a and write expression for either H2 or h (DBN). v=7, e=5

$w^{2}+ H\_{2}^{2}=L\_{2}^{2}$ (6) P. Theorem

Check off H2 and write expression for either h or L2. v = 8, e = 6

L2 = 10 (7) Given

Check off L2 and write expression for h. v=8, e=7

h=3 (8) Given

All required relationships are determined. Ready for solution.