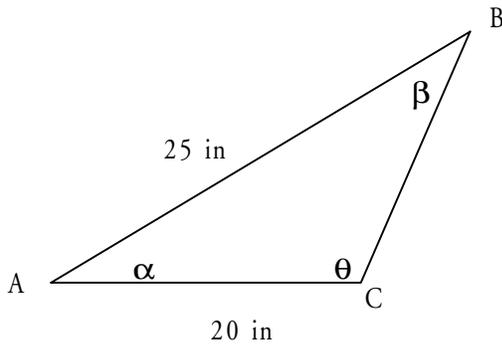


2 EGR 120  
 3 Introduction to Engineering  
 4 File: Tables2.xls  
 5

## 6 Example 2: Tables of Calculations using MicroSoft Excel

7  
 8 Problem: Analyze the triangle shown below to determine the values of side BC and angles  $\beta$  and  $\theta$   
 9 as angle  $\alpha$  varies from 0 to 90 degrees.



10  
 11  
 12  
 13 **Note:** the letter b was highlighted and then the font was changed to the SYMBOL font. See the example "Generating Special Symbols in Excel" for a full list of Greek letters.

14  
 15  
 16  
 17 **Note:** The drawing was produced using the drawing tools at the bottom of the screen. If they do not appear, add them using **View - Toolbars - Drawing**

18  
 19  
 20 The triangle above can be analyzed using the law of cosines to find BC:

21  $BC^2 = AB^2 + AC^2 - 2(AB)(AC)\cos(\alpha)$

22  
 23 **Note:** Type in  $BC^2=AB^2+AC^2-2(AB)(AC)\cos(a)$  and then highlight each 2, right-click, select Format Cells, and pick superscript. Highlight a and change the font to SYMBOL.

24 And then use the law of sines to find  $\beta$  and  $\theta$ :

25  $\frac{\sin(\alpha)}{BC} = \frac{\sin(\beta)}{AC} = \frac{\sin(\theta)}{AB}$

26  
 27 **Note:** Another option for generating equations is to use the Microsoft Equation editor. Select **Insert - Object - Microsoft Equation**

28 The following relationship may also be useful:  
 29  $\alpha + \beta + \theta = 180$

30  
 31

$\alpha$ (degrees)	BC (in)	$\beta$ (degrees)	$\theta$ (degrees)
0	5.00	0.0	180.0
10	6.34	33.4	136.6
20	9.24	49.1	110.9
30	12.61	56.1	93.9
40	16.09	60.2	79.8
50	19.55	63.2	66.8
60	22.91	66.0	54.0
70	26.13	69.2	40.8
80	29.18	73.1	26.9
90	32.02	78.8	11.2

32 **Notes:**

33 In cell C33 type the formula: =SQRT(25^2+20^2-2\*25\*20\*COS(RADIANS(B33)))

34 In cell D33 type the formula: =DEGREES(ASIN(20\*SIN(RADIANS(B33)/C33)))

35 In cell E33 type the formula: =180 - B33 - D33

36 Then copy the formulas into the remaining cells.