Solution to Problem 132

by Dave Lindell, L.S.

An inverse from the calculated coordinates of point C shows line CA to be N 52°46'17" W 403.394' and line CB to be N 36°13'43" E 302.545'. The angle between these two bearings is 89°00'00", the "measured" angle entered by mistake.

By the Law of Cosines, the inversed distances yield:

$(AB)^2 = 403.394^2 + 302.545^2 - (2)(403.394)(302.545)\cos 89°$
$= 254{,}260.1963 - 4259.9522$
$= 250{,}000.244$
AB = 500.002, so the baseline distance still checks.

Using measured data for side lengths and the "measured" angle:

$(AB)^2 = 400.000^2 + 300.000^2 - (2)(400.000)(300.00)\cos 89°$
AB = 495.7937

Now 500.000 / 495.7937 = 1.008483912

so that 1.008483912 x 400.000 = 403.3936 and 1.008483912 x 300.000 = 302.5452, the inversed values for the distances.

The program held the "measured" angle and scaled the distances to fit the baseline.

What would your program/calculator do?

Solution to Problem 133

by Benjamin Bloch, Ph.D.

You can immediately place any number in its single digit column. If you examine the **1** column you notice that each number in that column, 10, 19, 28, and 37, adds to **1** when you add their digits until you get a single digit. For example, there's the number 10 whose digits 1 and 0 add to **1**; the number 19 whose digits 1 and 9 add to **10**, whose digits 1 and 0 add to **1**; the number 28 whose digits add to 10 whose digits add to **1**. The final single digit we call the SDQ or single digit quality. Write this mathematically as 10=>**1**, 19=>10=>**1**, 28=>10=>**1**, and 37=>10=>**1**.

a) The sum would be a number in the **5** column, since **3 + 2 = 5**.

b) 958,877,535 + 22,719,854 =? 981,597,289
Since 958,877,535=>57=>12=>**3**
And 22,719,854=>38=>11=>**2**
While ? 981,597,289=>58=>13=>**4**
Therefore 3 + 2 = **5 ≠ 4** and the sum ?981,597,289 is ***incorrect***.

The correct answer is 958,877,535 + 22,719,854 = 981,597,389.
981,597,389=>59=>14=>**5**
So that **3 + 2 = 5 = 5**.

c) 13.6005 + 12.02 + 9.21 =? 34.7205
Since 13.6005=>15=>**6**
And 12.02=>**5**
And 9.21=>12=>**3**
And 6 + 5 + 3 = 14=>**5**
While ? 34.7205=>21=>**3**
Therefore 6 + 5 + 3 =>**5 ≠ 3** and the sum ? 34.7205 is ***incorrect***.

The correct answer is 13.6005 + 12.02 + 9.21 = 34.8305
34.8305=>23=>**5**
So that 6 + 5 + 3 =>**5 = 5**.