**Include a copy of the description of the problem (as seen below) with your submission.**

*Numerical, Graphical, and Analytic Analysis.* The cross sections of an irrigation canal are isosceles trapezoids of which three sides are 8 feet long (see figure). Determine the angle of elevation *x*of the sides so that the area of the cross section is a maximum by completing the following.

 

1. Open a Power Point or an MS Word document and create a table similar to the table below. Complete seven rows of the table (the first two rows are given). What is you tentative conclusion?

|  |  |  |  |
| --- | --- | --- | --- |
| Base 1 | Base 2 | Altitude | Area |
| 8 |  |  | 22.1 |
| 8 |  |  | 42.5 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

1. Once you have determined the angle that generates maximum area in the table above, create a new table with the same top row and 7 rows for calculations. Use increments of one degree and let the maximum angle from your first table occupy the middle row of your new table. From the table calculations, what is your prediction for the angle that generates maximum area? What would be your next step if you were to use tables to get accuracy to the nearest tenth of a degree?
2. Use Equation Editor to write the cross-sectional area A(x) as a function of x. Use calculus to find the critical number(s) of this function and find the angle that will yield the maximum cross-sectional area. Show your work in Equation Editor.
3. Use Winplot to graph the function in part 3 and verify the maximum cross-sectional area. What value of x on the graph generates the maximum area? Convert this value of x to degrees. Comment. Use the settings below.

 