Open Channel Flow Sections Program

This program will calculate and store open channel section variables needed for hydraulic calculations. These channel section formulas can be found in “Open-Channel Hydraulics” by Ven Te Chow. The channel sections that can be calculated are rectangular, trapezoidal, triangular, circular, parabolic, round-cornered rectangular, and round-bottomed triangular. The output of these respective variables are as follows:

a = Area

p = Wetted Perimeter

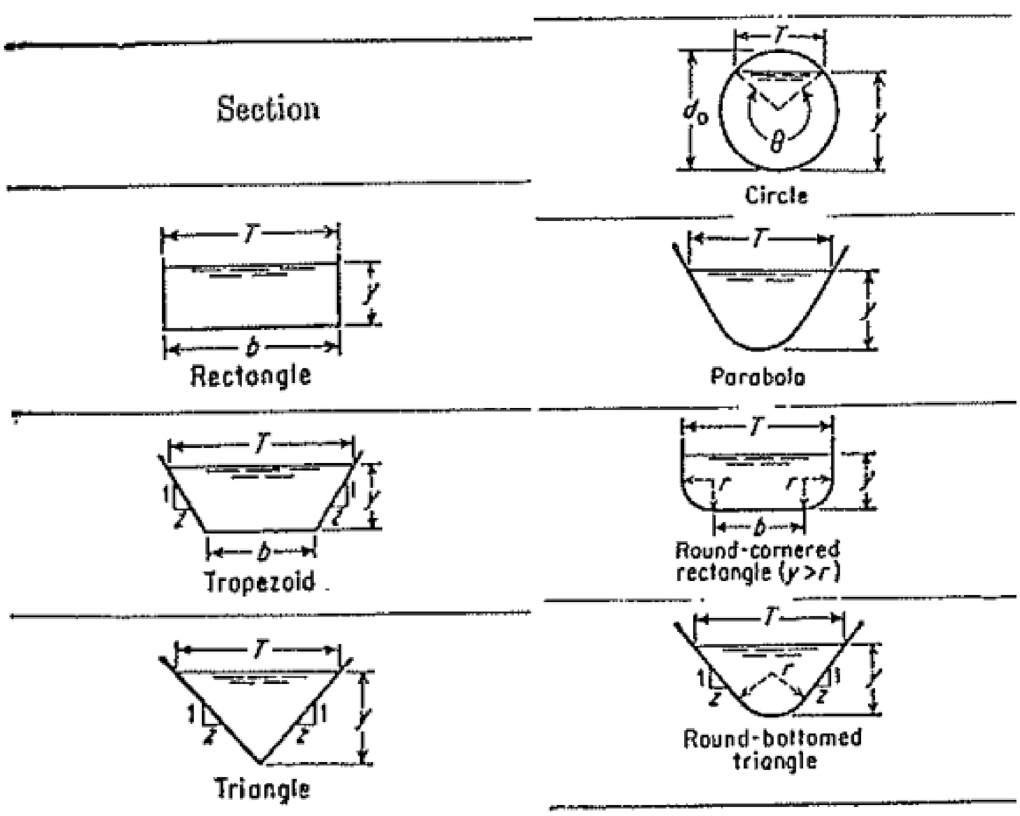
r = Hydraulic Radius

t = Top Width

d = Hydraulic Depth

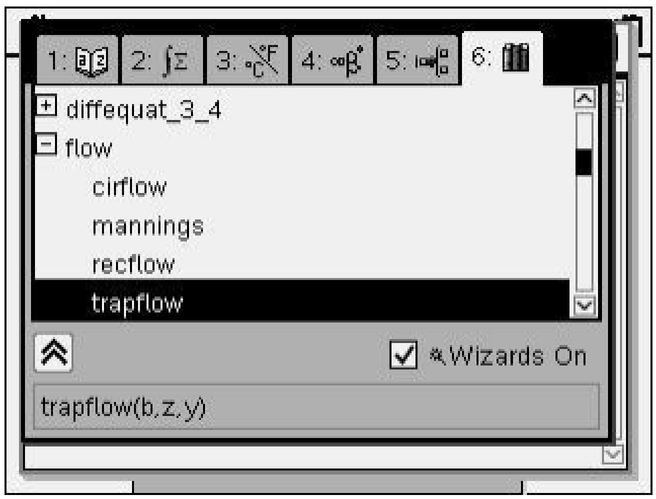
zs = Z Section Factor

The inputs for the geometric sections such as base width, side slope ratio etc, can be seen here:

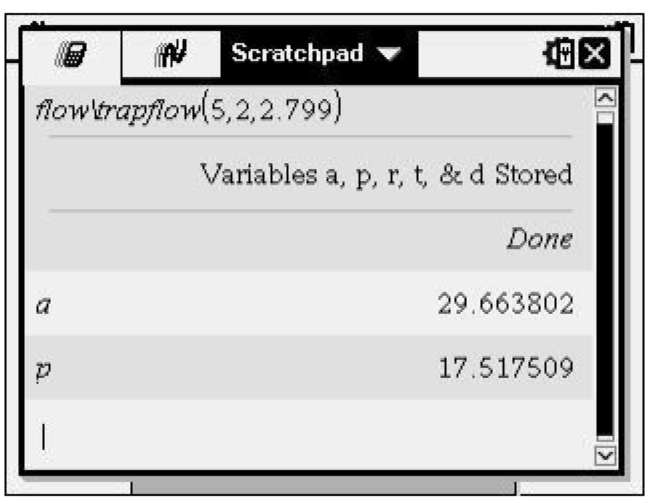


These can be stored in the program as values or symbolically with other named variables. I used the CAS version of the TI Nspire I cannot speak for the non-CAS version and how that operates. I'll give a couple examples of how to use this program below. Please note: after you download be sure to place the Flow.tns file in the "MyLib" folder on the calculator. If you don't have this folder, create it in the root directory and then place the file inside. Before you attempt to use this program, refresh your library. This can be done by opening the calculator window, press "doc" and scroll down to "6: Refresh Libraries" and select this. It may take a few minutes but that will update the libraries so this works properly. And on to the examples:

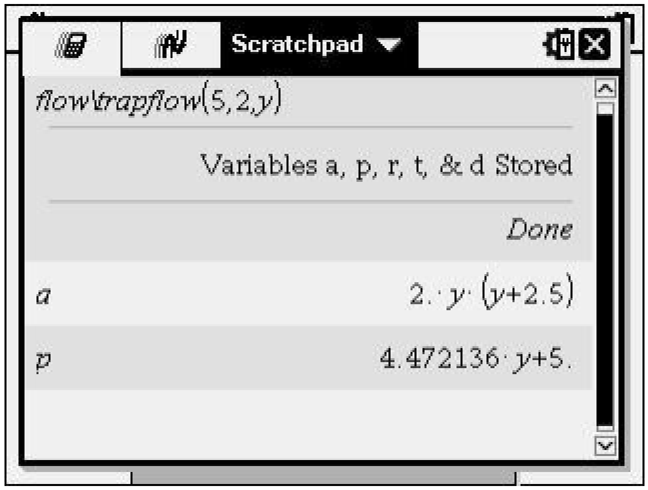
Trapezoidal channel section with bottom width (b) of 5 ft, side slope (z) of 2, and flow depth (y) of 2.799 ft. You go to your library and select "flow" then "trapflow" as seen below:



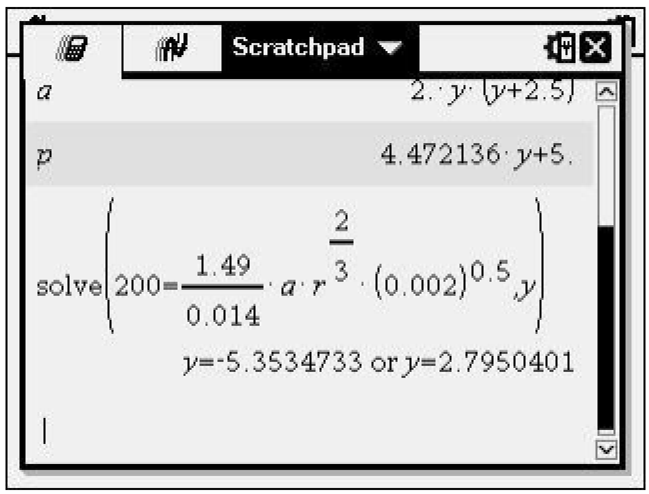
Hit enter and you will put the respective information in as indicated in the wizard, namely, (5,2,2.799). And that's it, the variables have been stored and can be recalled by simply using that variable as can be seen below:



You can also use this to save variables symbolically if it is unknown like this example:



You can then solve for the unknown in the Manning's formula for example:



This gives a normal depth (yn) of 2.795 ft from the results. I did include the Manning's formula in this program as well but it only solves for q (flow). Although you can solve equations with this, I have made a separate function for the Manning's equation (separate download) which you can select which variable to solve for and so you have better flexibility in manipulating the equations.

If you notice any mistakes please let me know.

Thank You,
Brian