ECOR 2606 Lab Test #2 v6

The Manning equation for water flowing in a rectangular open channel is

$$Q = \frac{1.0\sqrt{S}(BH)^{5/3}}{n(B+2H)^{2/3}}$$

where Q = flow (m^3/sec)
S = slope (m/m)
H = depth of channel (m)
B = width of channel (m)
n = Manning roughness coefficient (dimensionless)
the constant 1.0 has dimensions of $m^{1/3}$/sec

Part 1: Write an m-file function (calcH.m) that, given values for *Q*, *S*, *B*, and *n*, computes and returns *H*. You may assume that *H* lies somewhere between 0 and 1m. Have your function generate an error if the given value of *Q* is more than the calculated flow for *H* = 1m. Appropriate comments are required.

Note: If *H* and other parameters are known, the formula makes it easy to calculate *Q*. Your function is to do the reverse: it is given *Q* and other parameters and must calculate *H*.

Part 2: Assume that S = 0.05 m/m, B = 1.5m and n = 0.03 m/m. Produce a script file (script.m) that

i) Uses function *calcH* to create a plot (figure 1) of *H* vs *Q* for *Q* from 1 m^3/s to 5 m^3/s. You are expected to label the axes and so on.

ii) Outputs a table giving *H* for *Q* from 2 m^3/s to 4 m^3/s in steps of 0.1 m^3/s. Flows should be output with one decimal place and depths with four (as shown below).

```
Flow (m3/s)  Depth (m)
   2.0        0.dddd
   2.1        0.dddd
   2.2        0.dddd
    ... (and so on)
```

Part 3: Demonstrate your understanding of "no input/no output" functions and subfunctions by producing a single file (quiz2.m) that combines your answers to parts 1 and 2. When executed, script.m and quiz2.m should produce exactly the same results.

Submit calcH.m, script.m, and quiz2.m.