Purpose

The purpose of this assignment is to give you practice with writing more expressions for evaluation, some formatting and using Math library functions. You will need to create a program from scratch! Of course you start with one of the ones you've used already to get a basic sketch.

Problem

[60 points] The area of an ellipse with major axis **a** and minor axis **b** is given by $\pi ab.$ The circumference is harder to compute and we have many approximations, so we will use several of them:

- Ramanujan's formula, first approxmiation:
  $\pi \left[3(a+b) - \sqrt{(3a+b)(a+3b)}\right]$
- Ramanujan's formula, second approximation:
  π (a + b) [1 + 3 h / (10 + (4 - 3 h)$^{1/2}$)]
  where h = (a - b)^2 / (a + b)^2
- Muir's formula:
  2 π [a^s/2 + b^s/2]$^{1/s}$
  where s = 1.5
- Hudson's formula:
  0.25 π (a + b) [3 (1 + h/4) + 1 / (1 - h/4)]
  where h = (a - b)^2 / (a + b)^2
- Holder mean:
  4 [a^s + b^s]$^{1/s}$
  where s = log(2) / log(π /2)
- David Cantrell's formula:
  4 (a + b) - 2 (4 - π) a b / [a^s/2 + b^s/2]$^{1/s}$
  where s = 0.825056

Your program should prompt and read the major axis "a" and minor axis "b" and then calculate and display the circumference of an ellipse using each of the above formula and tabulate the results. Your program needs to accept just one set of inputs and print the results. Sample input and output files are available. If you have difficulty aligning the textual description in the first column of the table (these are all called "character strings") use %s format specifier if that helps.

[10 points] Use a constant for the value of PI. Use any functions from the library file math.h that are appropriate.

Input

The input will come from standard input, that is, from a user at the keyboard. Input prompts must be accurate. You will test input redirected from an input file.

Output

[20 points] Output formatting as specified in the sample output files. Output will be sent to standard output (the screen).

Testing

On all your assignments, including this one, it is crucial that you test your program thoroughly. Sample input and output files will provided which you can use for your testing and verifying your program output.

Programs that don't run receive a maximum of about 20 points. Do not add additional features that are not being asked for, since your program may not run against test inputs that I have created.

Details & Comments

[10 points]

- You must follow all the coding style rules as specified in our "coding guidelines". In particular:
  - You must put your name enclosed in a comment box at the top along with a brief description of what the program does, and add any other comments that are appropriate throughout the program.
  - Keep lines to a maximum length that's easy to read.
  - You must use good names for any variables you create (a full word that describes what it is there for).
- Details that you do not follow are penalized after other scored items are added up, so even if you got a 100 for the functionality of your program, you can still get a lower score because you did not follow all the other requirements for the assignment.

Submission

Submit this assignment with the code 1P:

```
submit 1P name-of-your-file
```

Grade Key

Name, comments, input order	**10**
Correctly computes ellipse circumference (10 points for each method)	**60**
Constant definition for pi, Use of Math functions	**10**
Output formatting	**20**