

Homework 1

Due: Friday, January 18, 2014 at 11:59pm

Points: 100

Please turn in your answers for the homework assignment on Canvas, under Homework 1 in Assignments.

Here, what the computer prints is in regular typewriter font, what you type is in *italic typewriter font*, and the symbol “`\n`” represents a return or enter.

- (25 points) Write a program that asks the user for the temperature t in degrees Celsius and then displays the estimated vapor pressure of water vapor in millibars at that temperature using the approximation

$$6.112e^{\frac{17.67t}{t+243.5}}$$

Here, e is the base of the natural logarithms; use the math module’s function `math.exp(x)` to compute e^x . To do this, put the line “`import math`” at the beginning of your program.

Use a function to compute the approximation. Your program should print the output in exactly this form (note you must have *exactly* 2 digits after the decimal point):

```
Enter temperature in degrees C: 10
At this temperature, the vapor pressure is approximately 12.27 millibars
```

Use your program to estimate the temperature at which the vapor pressure is approximately 10 millibars (to two decimal places).

Call this program “`vp.py`”, and put your answer in a comment at the beginning of the program.

Hint: One way to print the vapor pressure is to use the format string “`“%6.2f” % vp(t)`”, where t is the temperature and `vp(t)` is the function to compute the vapor pressure from the temperature t .

- (25 points) Modify the program you wrote for question 1 to print the estimated vapor pressures for temperatures between -20 and 50 degrees Celsius at 5 degree intervals. Your output should look like this:

```
temp    pressure
-----  -
-20     1.26
...
50     124.02
```

with the proper numbers substituted for the “...”s (so you need only compute the vapor pressure to 2 decimal places). Call this program “`vptable.py`”.

- (25 points) Write a program that reads an integer n and draws a regular polygon with n sides.

Call this program “`poly.py`”.

Hint: Remember that a “regular polygon” is one that has sides of equal length, and all angles of equal size.

- (25 points) The goal of the following program is to convert a temperature from degrees Fahrenheit to degrees Celsius. The formula is:

$$C = \frac{5}{9}(F - 32)$$

where F is the number of degrees Fahrenheit and C the number of degrees Celsius.

Here is the program:

```
ftemp = input("Enter degrees in Fahrenheit: ")
ctemp = 5 // 9 * (ftemp - 32)
print(ftemp, "degrees Fahrenheit is", ctemp, "degrees centigrade")
```

But there are two problems:

- (a) Whenever I run the program, it gives me a `TypeError` message as soon as I enter my number.
- (b) Once I fixed this problem, it always tells me the result is `-0.0` degrees Celsius.

Please fix both these problems, so the program converts Fahrenheit to Celsius correctly. The program must handle floating point numbers, so entering `"32.5"` should produce a (small) real number, not a `ValueError`.

Call your fixed program `"ftoc.py"`, and explain what caused the two problems in a comment at the beginning of the program.