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 “ˆ” represents a return or enter.

1. (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

\[
6.112 e^{17.67 \frac{t}{243.5}}
\]

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 \( t \).

2. (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”.

3. (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.

4. (25 points) The goal of the following program is to convert a temperature from degrees Farenheit 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:

```python
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.