In-Class Practice: Function Fun

1. (a) In Python, one can find x^y through the `pow(x,y)` function or by using the `**` operator, as in: `x ** y`. Some programmer had to implement these! Write your own function called `power` that works in the same way, except that y must be an integer. You must implement the function **without** calling the `pow()` function or using `**` (because **you're** the one implementing these!).

   (b) Write a program that repeatedly prompts the user for two values, a and b, a float and an integer, respectively. The program should display the result of a^b by calling the function you wrote previously. It should stop when a is negative.

2. Air pollution can be measured and converted to an "air quality index" that is in the range {0..100}. The higher the index is, the worse the air quality is. Because of traffic and industry, air quality changes during the course of a typical day. It is useful to monitor air quality on an hourly basis to help determine a course of action for a particular area. You will write a program to help in this endeavor. As you work, note how several small functions will solve the larger problem.

   (a) Write a `main()` that prompts the user for five air quality index values representing the hours of 10 and 11 AM, and 12, 1, and 2 PM. Display these values with appropriate labels.

   (b) Have `main()` call a function that makes sure the user types in a value that is between 0 and 100. The function should return this value using the `return` statement. The function should contain a loop to allow the user to try again if the input is invalid. This function should have NO parameters.

   (c) Add a second function that displays the air quality in a histogram. For example, if the five air quality index values were 20, 40, 50, 70, and 50 (from 10 AM to 2 PM, respectively), the histogram should look like the following:

```
Daily Air Pollution Comparison

Time
10  *  *
11  *  *  *  *
12  *  *  *  *  *
 1  *  *  *  *  *  *  *
 2  *  *  *  *  *
---------------------------------
   10 20 30 40 50 60 70 80 90 100
              Index
```

   Use `for` loops for ALL of the loops. Be sure to use the proper type of parameters! Round your values to the nearest index value. The graph should include axis labels.

   (d) Modify the above function to return the average pollution index for the day. The result should be displayed in `main()`.