Scientific Computing: Basic Methods
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Homework 2: Basics of Python

For the following exercises, write your code in one `.py` *file for each problem. Be sure to use a plain text editor (i.e., NOT Word). For parts that require written explanation, use the* `print()` *function to print your answers to the screen when the script is run.*

Remember that unlike with using the python interpreter, commands will not print out to the screen automatically when run through a scripting file. Wrap each command you'd like to print to the screen in the function `print()`*.*

Make sure that your scripts run without error in order to get credit. Do not hesitate to ask for help if needed!

Problem 1 (5 pts)

Our goal is to generate a list of the first 10 *odd* integers larger than 20. Do this using each of the following methods:

(a) a `for` loop combined with the `append` function

(b) list comprehension and the `range` function

For each case, print out the list when it's complete.

Problem 2 (5 pts)

Write a `Python` script that takes a single word as a *command line argument* and then prints the current day's date on a first line as `MM/DD/YYYY`, followed by
`The word you entered is "<word>".` on a second line, where `<word>` is the provided word within quotation marks. Use the `sys` module and use an `if` statement to have the script check that the correct number of command line arguments (one) is provided; if not, print a message to the user and exit cleanly.

Problem 3 (5 pts)

Use the `format` string method to write the following:

(a) The value of π with 4 digits after the decimal point;

(b) The value of $100\pi^2$ with 10 digits after the decimal point;

(c) Using a single print command, the value of π with 6 digits after the decimal point on one line, then the same value with 20 digits on a second line; make sure you only provide the value of π once!

(d) Set the variables $x = e^3$ and $y = \sin(\pi/3)$, then print the values of x and y each with 3 digits after the decimal point, followed by $x \cdot y$ in scientific notation with 4 significant figures.

(e) Define the list [1, 5, 10], then print it in reverse order with each number printed with 3 digits, preceded by zeros (0) as needed. Try to provide the list variable to format (as opposed to each element separately). *You cannot use the* `reversed` *function for this problem. The goal is to pull the elements from the list in reverse order using some sort of string formatting.*

Problem 4 (5 pts)

Write a python script that will create the following directory structure in the local folder:

```
A          B          C
  1          1          1
  2          2          2
  3          3          3
  4          4          4
```

Within each of the numbered folders, create a file called "`info.txt`" that contains the text `"This file is in folder <letter>/<number>."` where `<letter>` is `A, B,` or `C` and `<number>` is `1, 2, 3`, or `4`. You will need to use the `os` module and some nested `for` loops. Use the `write` function to create the `.txt` files and make sure to use the `format` method for strings.