Python for Math and Stat Fall 2022
Exam 2 Version A

Assume that all necessary packages have been imported.

1. (20 pts) For the following 4 problems, write down what each code block would display if executed in a Jupyter cell. If the code generates an error, write `Error`.

   (a)
   ```
   list(zip(range(9, 1, -2), range(4)))
   ```

   (b)
   ```
   m, n = 2, 8
   f'm+n {m*n}'
   ```

   (c)
   ```
   for i in range(8, 10):
       for j in range(5, 7):
           print(i, j, end=' ')
   ```

   (d)
   ```
   def func(n):
       print(n, end=' ')
       if n < 10:
           return n
       else:
           return func(n//10)

   func(203)
   ```

   Solution:

   (a) `[(9, 0), (7, 1), (5, 2), (3, 3)]`

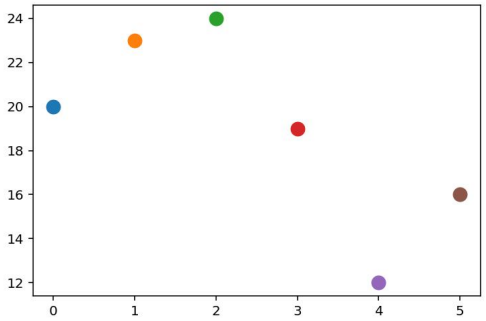
   (b) `'m+n 16'`

   (c) `8 5 8 6 9 5 9 6`

   (d)
   ```
   203 20 2
   2
   ```

2. (10 pts) You wish to plot the average daily temperature over several days. Write a function **`avgtemp(start, changes)`** that takes a starting temperature and a list of changes in degrees over the next few days, and displays the daily temperatures as a scatter plot. The function does not return a value.

   For example, `avgtemp(20, [3, 1, -5, -7, 4])` would show an initial temperature of 20, then an increase of 3, then an increase of 1, then a decrease of 5, etc., as shown below.



Solution:

```
def avgtemp(start, changes):
    plt.plot(0, start, 'o')

    curr_temp = start
    for index, val in enumerate(changes):
        curr_temp += val
        plt.plot(index + 1, curr_temp, 'o')
    plt.show()
```

3. (10 pts) Your office supplies store keeps track of inventory in a file `'merchandise.csv'`. The file contains a header row followed by product information, one product on each line:

```
ID,Item,Price,Count
2196,Pentel Pencils,10.79,43
1058,Post-it Pads,13.99,68
...
```

You have read in the file:

```
with open('merchandise.csv') as fp:
    lines = fp.readlines()
```

Write code to convert the information in `lines` into a dictionary named **`merch`** with each key corresponding to an item name and each value is a tuple containing the price and quantity of the product. The tuple elements should be numbers. The dictionary should look like:

```
{ 'Pentel Pencils': (10.79, 43), 'Post-it Pads': (13.99, 68), ...}
```

Solution:

```
merch = {}

for line in lines[1:]:
    ID, item, price, count = line.split(',')
    merch[item] = (float(price), int(count))
```

4. (10 pts) You're playing a game that begins with an initial score. For each move in the game, you roll a die. If the die shows 5 or 6, your score increases by that amount. If the die shows 1, 2, 3, or 4, your score decreases by that amount. For example, suppose your initial score is 7 points and your first roll is 3. Your score will decrease to 4 points. If your second roll is 6, your score then will increase to 10 points.

   Write a function **`score(initial)`** that simulates this game starting with a score of `initial` points and repeatedly uses die rolls to update the score until the game ends when (a) the score reaches 20 or more points, in which case the function returns `'win'`, or (b) the score reaches 0 or fewer points, in which case the function returns `'lose'`.

   Solution:

```
def score(initial):
    pts = initial
    while 0 < pts < 20:
        roll = random.randint(1, 6)
        if roll >= 5:
            pts += roll
        else:
            pts -= roll

    return 'win' if pts >= 20 else 'lose'
```