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**Problem set # 1**

Due: Thursday, September 9th, by 4pm ET

1. Consider the following code:

```
1  str1 = "advanced"
2  print(str1)
3
4  str2 = "programming"
5  print(str2)
6
7  str = str1 + str2
8  print(str)
9
10 test = "gram" in str
11 print(test)
12 print(str[3])
13
14 str[1] = "p"
15 print(str)
```

What will be the result of the code? What will be printed to the console?

2. What will be result of the following Python code?

```
1  print (14 / 4, 14 % 4)
```

- (a) 3.5 3.5
- (b) 3.5 2
- (c) 3 3
- (d) 2 2
- (e) 3 2
- (f) The program will produce an exception

3. Consider the following code containing price data for a few ETFs:

```
1  tuple1 = ("SPY", "S&P Index", 290.31)
2  tuple2 = ("XLF", "Financials", 28.33)
3  tuple3 = ("XLK", "Technology", 75.60)
4  tuples = [tuple1, tuple2, tuple3]
```

```

5     spyClose = tuples[x][y]
6     print(spyClose)

```

What values of x & y enable us to extract the closing value of the S&P (290.31) from the variable tuples?

4. Consider the following set of ETFs:

<b>Ticker</b>	<b>Description</b>
SPY	US Equity
DBC	Commodities
HYG	High Yield
EEM	Emerging Market Equity
EAFE	Europe and East Asia Equity
AGG	US AGG
IAGG	International AGG

- Download data for the set of ETFs on yahoo finance and clean as needed.
  - Compute a table with annualized returns and annualized volatilities for the set of ETFs.
  - Compute a correlation matrix of daily returns for the set of ETFs.
  - Plot the cumulative returns to an investor holding each ETF, as well as an equally weighted portfolio.
5. Build an options strategy that replicates selling a put option using a call option and a position in the underlying index. Write functions in Python that compute the payoff function for each component as well as each portfolio and plot the payoffs in Python.