1 Powell Policy [9 Pts]

During a Congressional hearing on Tuesday (March 7th), Massachusetts senator Elizabeth Warren went after Federal Reserve chair Jerome Powell for his prediction that the unemployment rate will have to increase in order to tame inflation.

"In December, the Fed released its projections on the state of the economy under your monetary policy plan," Warren said. "According to the Fed's own report, if you continue raising interest rates as you plan, unemployment will be 4.6% by the end of the year, more than a full point higher than it is today." Warren then asked Powell what he might say to the two million Americans who would be put out of work under this scenario.

All code for this question, where applicable, must be written in Python, unless explicitly stated otherwise. You may assume that pandas has been imported as `pd`.

(a) [2 Pts] Why did the Federal Reserve raise interest rate in a period of high inflation?
Hint: You will need to explain what dual mandate is.

Solution: See "FOMC and Macro Indicators" lecture slides.

(b) [2 Pts] Do you agree with senator Warren that raising interest rates and taming inflation will potentially slash a lot of jobs?
Hint: Use an economic theory we have covered in class to answer this.

Solution: Hint: What relationship does the Phillips Curve characterize?

(c) [1 Pt] You want to test out senator Warren's hypothesis yourself using data from the previous interest rate hikes. Suppose you have a dataset `fed` with four columns: `year`, `decade`, `ffr` (Federal Funds Rate), and `inflation`. First, you want to know how many unique decades there are in the dataset. Write some code in Python that help us answer this.

Solution:

```
len(fed["decade"].unique())
```

(d) [2 Pts] Next we want to use only the observations in periods when there were high inflations. In doing so, let's only keep rows within decades where the average inflation rate in that decade is higher than 5%. Assume the years and the decades are strings that can be converted to integers. Inflation rate and Federal Funds rates are floats and in percentages (for example, 5.0 for 5.0%). Fill in the blanks below.

```
# convert the year and decade columns to int
fed[_________________] = ____________________________________________
fed[_________________] = ____________________________________________

# get the high inflation decades
high_inflation = fed.groupby(_____________________)\
._____________(lambda df: ____________________________________________)
```

Solution:

```
# convert the year and decade columns to int
```

```
fed["year"] = fed["year"].astype(int)
fed["decade"] = fed["decade"].astype(int)

# get the high inflation decades
high_inflation = fed.groupby("decade")\
.filter(lambda df: df["inflation"].mean() > 5)
```

(e) [2 Pts] But the previous dataset `fed` doesn't have all the data we need! There's an another database `fed2` in SQL that contain the rest of the data. (So the data structure is the same as `fed`!) Write a SQL query that returns a list of decades with average inflation rate greater than 5%.

Solution:

```
SELECT decade FROM fed2
GROUPBY decade
HAVING AVG(inflation) > 5;
```