Senior Data Scientist Exercise

This exercise is designed to test your analytical, modelling and coding skills. In addition, we want to evaluate your ability to formulate interesting questions and present your findings and results.

1. Pricing

Our marketing manager was surveying the willingness to buy one of our fashion items at a certain price. They discovered the demand quantities, i.e. the number of people willing to buy, at various price levels. We have them below in two arrays.

Please find out the optimal price that maximises revenue.

Hint: our two different methods place the answer between 25 and 50. We are more interested in your approach, methods and code than getting an exact answer for this part.

```
import pandas as pd

pricing = pd.DataFrame({
    'prices': [100, 90, 70, 60, 40, 20, 10],
    'demand': [100, 120, 200, 300, 1200, 2000, 2800]
})

def revenue_maximizing_price(prices, demand):
    # your code here
```

The supplier for this particular fashion item has applied *progressive discounting* on their price. This means that quantities of the item above a certain value cost progressively less than the initial quantities. This is their pricing table:

quantity	supplier price
<= 50	15
51 - 100	12
101 - 200	8
> 200	4

Knowing the demand (from the previous question) and the supplier price, and assuming that the only costs we have are the cost of the goods we sell, please find the price that maximizes our profits.

```
def profit_maximizing_price(...):
    # your code here
```

2. Regression

In the attached file `sales.csv` there is weekly sales of individual product types.

- What can be said about the overall trend and seasonality of sales? What of the individual product type?
- Are there correlations between sales of some product types, and if so, which?
- Select a single product type and make forecast about its sales for 5 time periods (weeks) from the last observed data point. Please include confidence interval of this forecast.

Note: Please make sure that we can reproduce your results, and feel free to ask questions if needed.

Once you are done, create a short presentation containing your question, problem definition and explaining your findings. Publish your code on GitHub and include a README, explaining how to execute your code. Send the link to your repository and the presentation to jobs@newyorker.de once you have completed the exercise.

We are looking forward to your solution.

Good luck!