Q1.

Q1a: Numerical and Discrete

Number of Ingredients

Q1b: Numerical and Continuous

Cost of the food

Q1c: Categorical and Nominal

Delivery type(take-out, delivery, dine-in …)

Hot or cold

Q1d: Categorical and Ordinal

Spicy level(mild, medium, hot, extra hot)

Q2.

Q2a:

Hot or Cold:

- Processing necessary(Value conversion is needed)

- Decimal type.

- Assign cold to 0, hot to 1.

Q2b:

Delivery type:

- Processing necessary(Value conversion is needed)

- Decimal type.

- Assign dine-in, home-made to 0 and take-out and delivery to 1.

(The value 'home-made' is ambiguous, so assign that value to the default value)

Q2c:

Number of Ingredients:

- No processing necessary

- Decimal type.

- Just input the decimal value.

Q2d:

Weight:

- No processing necessary

- Decimal type.

- Just input the decimal value in gram units.

Q2e:

Nationality:

- Processing necessary(Value conversion is needed)

- Decimal type.

- Assign n/a to 0, American to 1, Asian to 2, Italian to 3 …

Q3.

I think there are several problems about the data quality.

First one is that there are so many null values. To prevent null values, assign a default value when receiving input data from users.

Second one is that there are some values out of the layout and irrelevant. We can remove values by simply deleting them.

Q4.

Q4a:

If we add all features from Spring into Fall data, it will increase dimensionality of data. High dimensionality could cause difficulty of understanding, high

computational cost, high storage cost. Therefore, dropping all extra features from Spring would be a good approach.

Q4b:

Extra features might have some important data about 'Lunch features'. By dropping the features we might lose those data. Therefore, dropping all extra features would be bad idea.
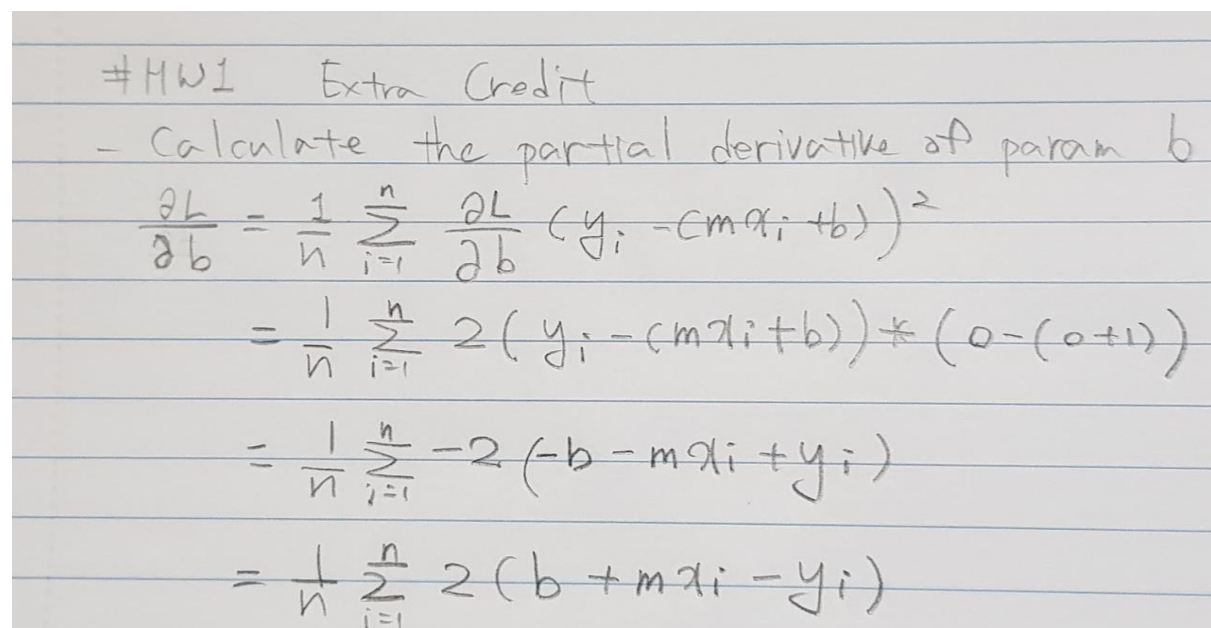
Q4c:

By adding all extra features to the Fall data, we can preserve all the data which could have important features about 'Lunch features'. Therefore, adding all extra features would be a good ida.

Q4d:

By adding all extra features to the Fall data, it will definitely increase a dimensionality of the data. It will make the result difficult to read and understand. It also demands more storage, and it will end up spending more budget. Therefore, adding all extra features would be a bad idea.

Q. Extra Credit.

#HW1   Extra Credit

- Calculate the partial derivative of param b

$$\frac{\partial L}{\partial b} = \frac{1}{n} \sum_{i=1}^{n} \frac{\partial L}{\partial b} (y_i - (m x_i + b))^2$$

$$= \frac{1}{n} \sum_{i=1}^{n} 2(y_i - (m x_i + b)) * (0 - (0 + 1))$$

$$= \frac{1}{n} \sum_{i=1}^{n} -2(-b - m x_i + y_i)$$

$$= \frac{1}{n} \sum_{i=1}^{n} 2(b + m x_i - y_i)$$