Week 3

LATEST SUBMISSION GRADE

80%

1. You are running an analysis on rental prices in a major city of your country. You have plotted a histogram of your data and, not surprisingly, found that the Normal distribution does not fit your data well. Your colleague, however, insists that it is still fine to fit a bell curve. What do you tell your colleague? **1 / 1 point**

- The bell curve will not accurately capture right-tail outliers, namely the expensive housing in the rich part of town.
- Rental prices cannot be less than zero, but the bell curve is symmetric and thus may imply the possibility of a negative rental price.
- The mean rental price will typically exceed the median, but the bell curve would require they be equal.
- (selected) All of the above.

✓ **Correct**
Correct.

2. Which of the following is the MOST likely to follow a Normal distribution? **1 / 1 point**

- The weight of ships and boats registered in a particular country.
- (selected) The combined total time until failure of a packet of 6 light bulbs.
- The height of people (men and women) of a particular ethnicity.
- Student ID numbers at a particular university.

✓ **Correct**
Correct. Especially because we are adding together 6 separate observations, we would expect a bell curve to appear. Watch the video: Normal Distribution and Histograms

3. You are a high level manager reviewing the financial and other data of your company. Which of the following would you LEAST likely believe to be modelled by a bell curve? **1 / 1 point**

- The average number of hours per week that individual employees work.

- [x] Annual bonuses paid to employees.
- [ ] Total weekly sales made throughout the past 3 years.
- [ ] The amount of electricity used each business day (assuming that data was also available).

Correct

Correct. We would expect the annual bonuses to be right skewed (a small number of high level employees would receive large bonuses). Review video: Normal Distribution and Histograms

4. For a particular dataset, you believe that the bell curve is a good fit for the data. You have estimated that the mean is 16 and the variance is 9. To check whether the bell curve is a good fit, you decide to use the “Empirical Rule” as described in the course video. Calculate the interval for which 95.45% of your observations should lie. **0 / 1 point**

- [x] The interval would start at -2 and end at 34.
- [ ] The interval would start at 10 and end at 22.
- [ ] We need more information in order to calculate this interval.
- [ ] The interval would start at 7 and end at 25.

Incorrect

Incorrect. As we said in the video, The empirical rule, 95.45% of observations would lie within 2 STANDARD DEVIATIONS of the mean. If necessary, also review the third video of week on Measures of Dispersion for the relationship betweeen variance and standard deviation.

5. Orders at a particular shipping company are found to be normally distributed with a mean of $100,000 and a standard deviation of $20,000. What is the probability that the next order will be larger than $120,000? Select the closest answer. **1 / 1 point**

- [ ] 31.73%
- [x] 15.87%
- [ ] We need more information in order to calculate this value.
- [ ] 4.55%

Correct

Correct. Review video, the empirical rule.

6. You are consulting for a factory that produces a specialised component used in automobile manufacturing. From existing data, you believe the weight of each component is Normally distributed with a mean of 2kg (2000 grams) and a standard deviation of 1 gram. It is known that if the component weighs more than 2003 grams, it could lead to catastrophic failure of the automobile. There is no issue if the component is underweight. From this information, what proportion of components are considered defective? Select the closest answer. **1 / 1 point**

- 4.55%
- 0.14%
- 0.27%
- 2.28%

✓ **Correct**

Correct. From video, the empirical rule, 99.73% of observations lie WITHIN 3 standard deviations of the mean, so that 0.27% lies OUTSIDE of 3 standard deviations, half of which are ABOVE the mean.

7. You have recently started observing the share prices of company ABC and company XYZ. You have noticed that on days when the share price for ABC goes up, the share price of XYZ tends to go down, and vice versa. What are your expectations about the correlation between the share prices of ABC and XYZ? **0 / 1 point**

- The correlation should be 0.
- We have not gathered enough information to have an expectation.
- The correlation should be negative.
- The correlation should be positive.

! **Incorrect**

Incorrect. The question has noted that the 2 share prices move in opposite directions. This strongly suggests a negative correlation. Review video: Covariance & Correlation

8. After spending a lot of time at the local café, you have noticed a pattern exhibited by the pedestrians walking by: people that carry umbrellas also tend to be wearing coats. What is the correct conclusion from this observation? **1 / 1 point**

- The carrying of umbrellas causes the wearing of coats; people that carry umbrellas need somewhere to store it, namely in a coat pocket.
- There is probably some underlying factor common to both of these occurrences.

- The wearing of coats causes the carrying of umbrellas; people are trying to protect their expensive coats.

Correct
Correct. The common underlying cause is most likely cold weather/rain.

9. You are analysing some data on spending patterns of customers at your business. In particular, you have gathered the total amount spent in each transaction over the past year. You have concluded that a Normal distribution will accurately fit your data. How would you obtain the two parameters, mu and sigma squared, for this fitted Normal distribution? **1 / 1 point**

- mu would be given by the sample mode, sigma squared would be given by the sample inter quartile range (the upper quartile minus the lower quartile).
- mu would be given by the sample mean, sigma squared would be given by the sample variance.
- mu would be given by the sample mean, sigma squared would be given by the sample standard deviation.
- mu would be given by the sample median, sigma squared would be given by the sample standard deviation.

Correct
Correct. Review the video, the empirical rule.

10. Two variables X and Y in your dataset are known to be dependent. What can you say about their correlation? **1 / 1 point**

- The correlation must be positive.
- The correlation must be negative.
- The correlation must be 0.
- We need more information before we can comment on the correlation.

Correct
Correct. Review video: Covariance & Correlation