

## Week 10 Wednesday

## Logistics

No Class Friday

Final Exam Information

## Review

Lecture A00: Starting from last problem and going backwards

Lecture B00: Starting from first problem and going forwards

Both podcasts are available to everyone through Canvas

1. **Japan** experiences an earthquake of magnitude at least 8.0 every 5 years on average. As of today, the last such earthquake was just over 12 years ago — the Tōhoku Earthquake of March 2011, which was followed by a tsunami and the Fukushima Daiichi nuclear disaster.

What is the probability of observing a gap of more than 12 years between earthquakes of magnitude at least 8.0 in Japan?

2. In 2016, it was estimated that 87% of Black Americans identify with the Democratic Party.

Suppose that, in a simple random sample of 1000 Black Americans, you find that 900 identify with the Democratic Party. Compute and interpret a p-value for the data under the hypothesis that the proportion of Black Americans who identify with the Democratic Party is unchanged since 2016.

3. Half of the book collection at a certain library is in English and the remaining half is in Spanish. You are given 3 random books from this library. What is the probability that at most 1 out of the 3 books is in Spanish?

- (A) Less than 50%
- (B) Exactly 50%
- (C) More than 50%

4. Suppose that, in a simple random sample of 100 Asian Americans and 100 Hispanic Americans, you find that 67 of the Asian Americans and 63 of the Hispanic Americans identify with the Democratic Party. Compute and interpret a 90% confidence interval for difference in proportions of Democratic Party identification between Asian Americans and Hispanic Americans.

5. You are interested in comparing the distribution of annual income (regarded as a numerical variable) between religious people and non-religious people in the United States. Which of the following types of plots might you use to visualize this data?

- (A) Two-variable mosaic plot
- (B) Hollow histograms
- (C) Stacked bar plot
- (D) None of the above



6. In a simple random sample of 25 red delicious apples, weights are roughly normal with a sample mean 9 oz and a sample standard deviation of 1 oz. Compute and interpret a 98% confidence interval for weights of red delicious apples.

7. Which of the following types of continuous distributions is right-skewed?

- (A) Normal distribution
- (B) Exponential distribution
- (C) t distribution
- (D) None of the above

8. Japan experiences an earthquake of magnitude at least 8.0 every 5 years on average. What is the probability that Japan experiences no earthquakes of magnitude at least 8.0 in the ten-year period starting in 2030?

9. **Suppose** that you collect the following data from a simple random sample of 200 US adults about their age and whether or not they have tried out ChatGPT.

	Ages			
	18–29	30–49	50–64	65+
Have tried ChatGPT	20	15	10	5
Have not tried ChatGPT	40	35	45	30

If age was independent of whether or not someone has tried out ChatGPT, what would be expected number of 18–29 year olds who have not tried out ChatGPT?

10. Alice will compute a 95% confidence interval for the average volume of a watermelon using a simple random sample of 200 watermelons. Bob also wants to compute a 95% confidence interval for the average volume of a watermelon, but it's okay with him if his confidence interval is twice as wide as Alice's. Roughly how big a sample will Bob need to collect?

- (A) 50 watermelons
- (B) 100 watermelons
- (C) 400 watermelons
- (D) None of the above

11. A rapid antigen test for Covid has a 11% false positive rate and a 1% false negative rate.

Suppose that someone who decides that they need to take a Covid test has a 75% chance of having Covid. If you decide to take the test and you test positive, what is the probability that you actually have Covid?

12. Suppose that 80% of avocados are Hass avocados, and 10% of avocados originate from California. What can you say about the percentage of avocados that are either Hass avocados or grown in California (or both) if...

- (a) ... you don't know anything else?
- (b) ... you assume that type of avocado and place of origin are independent?
- (c) ... you assume that Hass avocados are never grown in California?