

Announcements

- Exam 1 tomorrow
(2/11) 6:30 - 8:30 PM

Normal Location (AUD MH)

- 1 normal sized crib sheet allowed **HAND WRITTEN**
- 20 MC Questions

Similar to review

- No Lecture Wednesday
 - no discussion Thursday
 - New office hours 2:30 - 4
- Tuesdays . 213 SH

- Suggested Crib Sheet format:
1st page compressed Liebrecht
2nd hand review problems.

Problem 1: Suppose that among customers of a retail company 50% have made a purchase online, 10% have made a purchase in a physical store, and 55% have made at least one purchase either online or in a physical store.

- a. What is the percentage of customers who have made both an online purchase and a physical store purchase?

$$P(O) = 0.5,$$

$$P(S) = 0.1, \quad P(O \cup S) = 0.55$$

$$P(O \cap S) = P(O) + P(S) - P(O \cup S)$$

$$= 0.5 + 0.1 - 0.55$$

$$= 0.05, \boxed{59\%}$$

- b. What is the percentage of customers who have made only an online purchase?

$$P(O \cap S^c) = P(O) - P(O \cap S)$$

$$= 0.5 - 0.05$$

$$= 0.45,$$

$$\boxed{45\%}$$

Problem 2: Suppose a sales representative makes 10 independent sales calls to potential clients. The probability that any single call results in a successful sale is 60% and assume all calls are independent. What is the probability that the sales representative makes at least one sale?

$$P(\text{At least one}) = 1 - P(\text{none})$$

$$P(S) = 0.6, P(S^c) = 0.4$$
$$= 1 - (0.4)^{10}$$

Problem 3: A certain college has 60% of its students as undergraduates and 40% as graduate students. Suppose that 70% of the undergraduate students live on campus while only 30% of graduate students live on campus. If a randomly selected student from the college is found to be living on campus, what is the probability that the student is an undergraduate? (4 points)

$$P(U \cap G) = 0.6, P(U \cap G^c) = 0.4$$

$$P(L \cap U \cap G) = 0.7$$

$$P(L \cap U \cap G^c) = 0.3$$

$$P(U \cap G^c | L \cap G) = ?$$

$$\begin{aligned} P(L \cap V_G)P(V_G) \\ P(V_G | L) &= \frac{P(L \cap V_G)P(V_G)}{P(L \cap V_G^C)P(V_G^C)} + \\ &= \frac{(0.7)(0.6)}{(0.7)(0.6) + (0.3)(0.4)} \end{aligned}$$

4)

Drake wants to know

on average how many minutes his fans listen to his music per year so he asks 100 of them.

- (a) What is the parameter?
- (b) What is the statistic?
- (c) What is the population?
- (d) What is the sample?

(ans)

- (a) Parameter: fans mean listening μ
- (b) Statistic: Sample mean \bar{x}
- (c) Population: All Drakes fans
- (d) Sample: 100 fans asked.

5) A curious individual records if students like pie,

cake, or ice cream more

(a) Is the data categorical or quantitative?

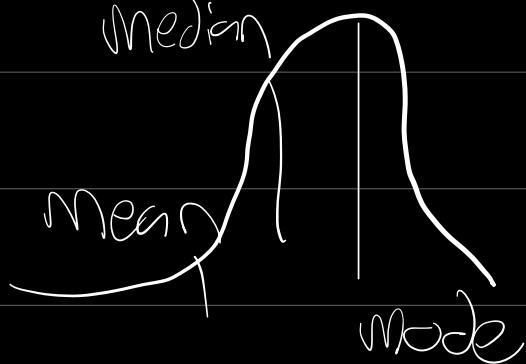
(b) What if he instead asks how many cakes the students had in 2025?

(a) Categorical

(b) Quantitative

(6) If $\text{mean} < \text{median} < \text{mode}$
is the data left or right
Skewed?

left-skewed.



(7) Given the data

$$\{11, 12, 14, 16, 19, 21, 26\}$$

(a) What is the Sample
Mean?

(b) Given $\sum (x_i - \bar{x})^2 = 172$

What is the Sample SD?

(c) What is the IQR?

(d) What are the bounds
for outliers?

(a)

$$\bar{X} = \frac{\sum_{i=1}^n x_i}{n}, \quad n=7$$
$$= \frac{119}{7} = 17$$

(b)

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1} = \frac{172}{6}$$

$$= 28.6$$

$$s = \sqrt{s^2}$$

$$= \sqrt{28.6}$$

$$= 5.35$$

$$\{11, 12, 14, 16, 19, 21, 26\}$$

Q₁

Q₃

$$IQR = Q_3 - Q_1$$

$$Q_1 = 12, \quad Q_3 = 21$$

$$IQR = 21 - 12 = 9$$

Outliers are

$$Q_3 + 1.5 IQR$$

$$Q_1 - 1.5 IQR$$

$$1.5 IQR = 13.5$$

$$\begin{aligned} Q_1 - 13.5 &= 12 - 13.5 \\ &= -1.5 \end{aligned}$$

$$Q_3 + 13.5$$

$$21 + 13.5 = 34.5$$

bounds are $(-1.5, 34.5)$

(8) Assume the vertical height of a kangaroo is normally distributed with a mean of 72 inches and a standard deviation of 10 inches.

What is the Z-score of 66 inches?

$$Z = \frac{X - \mu}{\sigma} = \frac{66 - 72}{10} = -0.6$$

(9) A factory develops a

new industrial process.

They take 200 batches

and randomly assign half to use this new process.

What is this an example of?

(Experiment) vs Obs Study vs Meta

(a) Epidemiologists want to determine if there is a link between cigarettes and hypertension. They view 1000 individual's medical records to collect data.

What is this an example of? What if they instead compile & investigate 20 other studies on this link?

Experiment vs Obs Study vs Meta

(a) Observational Study

(b) Meta analysis

11) Susie's Sandwich

Shop measures every 10^{th} sandwich to ensure they are a foot long. What type of Sampling is this?

1) Simple Random Sampling

2) Stratified Sampling ↗

3) Clustered Sampling ↗

4) Census, 5) Systemic Sampling

[Systemic Sampling]

12) A think tank uses

random digit dialling to

conduct a survey on

foreign affairs. What type

of Sampling is this?

Simple random sample.

13) A University admin asks 100 random students from [each dorm] their thoughts on communal bathrooms. What type of Sampling is this?

Stratified Sampling approach

14) A different admin asks 100 students in Burge their thoughts on communal bathrooms. What type of Sampling is this?

clustered Sampling

(15) Shaq makes 52% of his free throws. For fun he shoots 7 independently and counts the ~~#~~ made.

(a)

What is the probability he makes at least one?

$$P(\text{at least one}) = 1 - P(\text{none})$$

$$P(F) = 0.52, P(F^C) = 0.48$$
$$= 1 - (0.48)^7$$

$$= 0.99413$$

(b) What is the probability he makes at most 6 ?

$$P(\text{at most } 6) = 1 - P(\text{making } 7)$$
$$= 1 - (0.52)^7$$

= 0.9897

(c) Shaq shoots until he makes one and counts # shots taken. How many items are in the sample space?

$\infty \downarrow$

$\{+,-,+,-,\dots,\}$

16) Probability Someone likes gushers is 0.6. The probability Someone likes gushers and kitkat is 0.2. The probability they like neither is 0.3.

What is the probability someone likes kit kats?

(ans)

$$P(g) = 0.6$$

$$P(g \cap k) = 0.2$$

$$P(g \cap k^c) = 0.3$$

$$P(k) = ?$$

$$P(g \cap k^c) = P(g) + P(k) - P(g \cap k)$$

$$(g^c \cap g^k) = g^k$$

$$0.3 = 1 - 0.3 = 0.7$$

$$0.2 = 0.6 + P(k) - 0.7$$

$$P(k) = 0.3$$