

Statistics with Recitation — Quiz 6

December 2, 2025

Name: _____ ID: _____

1. (2 points) Which of the following statements about `ggsave()` is FALSE?
 - A. If no plot object is supplied, `ggsave()` saves the most recent plot drawn.
 - B. We can save a plot as a PNG file by using `ggsave(file = .png)`.
 - C. The `dpi` argument controls the quality of the saved image.
 - D. By default, `ggsave()` saves the plot to the current working directory.
2. (2 points) If we want to add a vertical line to our graph, which function should we use?
 - A. `geom_hline()`
 - B. `geom_vline()`
 - C. `geom_line()`
 - D. `vertical_line()`
3. (2 points) Which of the following statements is FALSE?
 - A. In `geom_hline()`, we use `intercept = ...` to set where the line is placed along the x-axis.
 - B. `facet_wrap()` supports faceting by multiple variables.
 - C. By default, the argument `scales = ...` in `facet_wrap()` uses "fixed", meaning the x- and y-axis scales are the same across all subplots.
 - D. `nrow` is an argument in `facet_wrap()` that controls the number of columns in the panel layout.
4. (2 points) Consider the following code:

```
1 data <- data.frame(  
2   id = 1:5,  
3   x  = c(3, 8, 2, 9, 5),  
4   y  = c(10, 2, 10, 3, 10)  
5 )  
6  
7 result <- data %>%  
8   filter((x > 4 & y == 10) | (x >= 8 & y < 5)) %>%  
9   select(id)
```

Which IDs are included in `result`?

- A. 1, 2, 4
B. 2, 4, 5
 C. 1, 2, 5
 D. 2, 3, 4
5. (2 points) Which of the following statements is TRUE?
- A. `&` only checks the first element of each vector; `&&` is vectorized.
 B. The output of `cumsum(1:5 %in% list(1:5))` is 1 2 3 4 5.
 C. `library(dplyr)` automatically loads all packages in the tidyverse.
D. The output of `5 < 6 & 3 > 1 | 7 < 3 & 4 < 2` is TRUE.
6. (2 points) What is the structure of the object `z` created by the following code?
- ```
1 x <- 1:5
2 y <- c(10,20,30,40,50)
3 z <- rbind(x, y)
```
- A. **A 2-by-5 matrix.**  
 B. A 5-by-2 matrix.  
 C. A 10-by-1 matrix.  
 D. A 1-by-10 matrix.
7. (2 points) Which of the following correctly generates 100 random values from a Poisson distribution with standard deviation 4?
- A. `rpois(100, lambda = 4)`  
 B. `rpois(100, rate = 4)`  
**C. `rpois(100, lambda = 16)`**  
 D. `rpois(100, rate = 16)`
8. (2 points) What does the following code generate?
- ```
1 seq(as.Date("2024-01-01"),
2     as.Date("2024-01-10"),
3     by = "2 days")
```
- A. **A sequence of dates increasing by 2 days.**
 B. A sequence of length 2.
 C. A character vector of dates.
 D. An error because `seq()` cannot be used with Date objects.
9. (2 points) Suppose:

```

1 x <- c("AB12", "CD34", "EF56")
2 substring(x, 3, 4)

```

Which statement is TRUE?

- A. It returns FALSE TURE FALSE.
- B. It returns the first two characters of each string.
- C. It extracts the numeric parts "12", "34", "56".
- D. It returns integers 12, 34, 56.

10. (2 points) Consider the following code:

```

1 df <- data.frame(
2   name = c("Alice", "Bob", "Carol", NA),
3   score = c(90, 85, NA, 70),
4   date = c("2025-01-01", "2025-02-15", "2025-03-10", "2025-04-20")
5 )

```

Which of the following statements is FALSE?

- A. The expression `dim(df)[1] == nrow(df)` always evaluates to TRUE for any data frame.
- B. Applying `na.omit(df)` will remove any row in which at least one column contains NA.
- C. Converting `df$date` using `as.Date(df$date)` works without specifying a format.
- D. The expression `grepl("0", df$score)` returns FALSE FALSE FALSE FALSE.

11. (2 points) Suppose:

```

1 counts <- table(c("A","A","B","B","A","B"),
2                 c("Yes","No","Yes","No","Yes","No"))

```

Which code correctly conducts a chi-squared test of independence?

- A. `chisq.test(prop.table(counts))`
- B. `chisq.test(counts)`
- C. `chisq.test(as.numeric(counts))`
- D. `chisq.test(table(counts))`

12. (2 points) What is the output of the following code?

```

1 grades <- data.frame(
2   class = c("A","A","B","B","B","A"),
3   pass  = c("Yes","No","Yes","Yes","No","Yes")
4 )
5

```

```

6 grades %>%
7   group_by(class) %>%
8   summarize(pass_rate = mean(pass == "Yes"))

```

A.

```

1 0.6667 0.6667

```

B.

```

1      [,1]
2 [1,] 0.6667
3 [2,] 0.6667

```

C.

```

1 class pass_rate
2 A      0.6667
3 B      0.6667

```

D.

```

1      pass_rate
2 A      0.6667
3 B      0.6667

```

13. (2 points) A company measures reaction time for each worker before and after a caffeine break. The results are stored in two equal-length vectors: **before** and **after**. Which R command correctly tests whether the caffeine break changed the average reaction time?

- A. `t.test(before, after)`
- B. `t.test(after, before)`
- C. `t.test(before, after, paired = TRUE)`
- D. `t.test(after ~ before)`

14. (2 points) Consider the following code:

```

1 damage_sunraku <- c(
2   1310, 1195, 1240, 1285, 1220, 1350, 1290, 1210,
3   1265, 1305, 1330, 1275, 1255, 1190, 1320
4 )
5
6 damage_psyger0 <- c(
7   1380, 1425, 1405, 1360, 1390, 1435, 1410, 1375,
8   1440, 1400, 1395, 1420
9 )
10
11 test_1 <- t.test(damage_psyger0, damage_sunraku)
12

```

```

13 df <- data.frame(damage = c(damage_sunraku, damage_psyger0),
14                   player = c(replicate(15, "Sunraku"),
15                             replicate(12, "Psyger-0"))
16                   )
17
18 test_2 <- t.test(df$damage ~ df$player)

```

Which of the following statements about `test_1` and `test_2` is correct?

- A. **The statistics calculated from these two tests are completely the same.**
- B. The statistics calculated from these two tests are different because one uses the paired sample t-test, while the other uses the two independent sample t-test.
- C. The statistics calculated from these two tests are slightly different because one uses the two independent sample t-test, while the other uses Welch two sample t-test.
- D. Although `test_2` works, `test_1` does not because the lengths of `damage_psyger0` and `damage_sunraku` are different.

15. (2 points) What is the output of the following code?

```

1 sales <- data.frame(
2   region = c("N","N","N","N","S","S","S","S"),
3   year   = c(2024,2024,2024,2025,2024,2025,2025,2025),
4   rep    = c("A","A","B","B","A","A","B","B"),
5   amount = c(100, 110, 120, 130, 90, 110, 150, 170),
6   cost   = c(40, 10, 60, 40, 20, 130, 230, 230)
7 )
8
9 stores <- sales %>%
10   group_by(region, year, rep) %>%
11   mutate(growth = amount - cost) %>%
12   summarize(mean_growth = mean(growth)) %>%
13   filter(mean_growth == max(mean_growth))
14
15 sum(stores$mean_growth)

```

- A. 90
- B. 160
- C. 210
- D. **220**

Answer Key

1.B 2.B 3.A 4.B 5.D 6.A 7.C 8.A 9.C 10.D 11.B 12.C 13.C 14.A 15.D