5. Business Statistics

Starter Quiz ·

University Business Name: _____ Score: _____

1. Nimbus wants to know whether weekends run slower than weekdays. Which design answers it?

   ☐ the first 40 orders the manager saw

   ☐ stratified: 20 weekend + 20 weekday orders

   ☐ 40 weekend orders only

   ☐ every 5th order of Saturday

2. The 40 times sum to 1,097.1 minutes. The mean, to two decimals?

   _____ min

3. n = 5, p = 0.2. P(exactly 2 late), to four decimals?

   _____

4. Sample: n = 16, s = 4.70. The standard error of the mean, to three decimals?

   _____ min

5. Sample mean 28.66, mu0 = 30, SE 1.175. The t statistic, to two decimals?

   _____

6. Fit: y = 17.4 + 4.83x. Predicted minutes at 2 km, to one decimal?

   _____ min

7. Checking p after every order and stopping at the first value under 0.05 keeps the true error rate at 5 percent.

   ☐ True ☐ False

8. A convenience sample of 10,000 orders is more trustworthy than a random sample of 40.

   ☐ True ☐ False

9. One delivery is mistyped as 168 minutes. What happens?

   ☐ the sd falls because the range is wider

   ☐ mean rises about 3 minutes, sd roughly quadruples, median barely moves - and the fence flags it

   ☐ nothing; one value of 40 cannot matter

   ☐ the median jumps to 168

10. P(late) = 0.2 and P(big order) = 0.3; both together 0.06. P(late or big)?

    ☐ 0.06

☐ 0.26

☐ 0.5

☐ 0.44

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Answers ·

University Business

1. **stratified: 20 weekend + 20 weekday orders**

   The claim compares days, so the sample must represent both. Saturday-only or convenience samples cannot answer it at any size.

2. **27.43 min**

   1,097.1/40 = 27.4275 ≈ 27.43. The median, for contrast, is 27.6.

3. **0.2048**

   $\binom{5}{2} \times 0.2^2 \times 0.8^3 = 10 \times 0.02048 = 0.2048$.

4. **1.175 min**

   $SE = 4.70/\sqrt{16} = 4.70/4 = 1.175$ - the sd of the sample mean, not of orders.

5. **-1.14**

   $(28.66 - 30)/1.175 = -1.14$ - inside the +/-2.131 acceptance region at alpha 0.05, 15 df.

6. **27.1 min**

   $17.4 + 4.83 \times 2 = 17.4 + 9.66 = 27.1$. At 3 km: 31.9 - inside the data's range, so a prediction, not a story.

7. **False**

   Optional stopping inflates the false-positive rate far above the nominal level - the threshold you ran is not the threshold you claim.

8. **False**

   Bias is systematic; size multiplies it. The random 40 estimates the population honestly, within a stated margin; the 10,000 estimates the convenient part precisely and wrongly.

9. **mean rises about 3 minutes, sd roughly quadruples, median barely moves - and the fence flags it**

   The mean gains 128/40 = 3.2 minutes; the sd explodes to about 22; the median moves 0.05. One keystroke owns the mean - which is why outliers are investigated, not ignored.

10. **0.44**

    $0.2 + 0.3 - 0.06 = 0.44$. Without the overlap subtraction the answer double-counts the big late orders.