

BRIEF ANSWERS TO PRACTICE FINAL EXAM QUESTIONS

This provides brief answers to help you check your understanding of the required procedures. You should give thorough explanations and interpretation where requested. Be prepared to use the 4-step method to present solutions to problems.

1)

a) $OVENB = 18.2 + .42 OVENA$

b) $r = .58$, $r^2 = .34$ or 34%.

c) 35.2

2) No, $t = .78$, $p = .46$ (Use a paired 1-sample, 2-sided t test; pairing of oven readings occurs because the data are collected at the same times from each oven). The normality condition holds.

3)

a) In symbols, $H_0 : \mu_{NO} = \mu_{EB}$ versus $H_a : \mu_{NO} > \mu_{EB}$.

b) 2-sample T-test for means yields: $t = 1.335$, $p = 0.0944$ and $df = 43.7$. Since $0.05 > p > 0.10$, there is only slight evidence in favor of the researchers' theory.

c) Supporting: 2 independent SRSs with reasonably large samples. The two distributions have similar shapes. Opposing: the distributions of number of dreams are strongly skewed right rather than normal.

4)

a) EB: 11, NO: 14

b) Using the plus-4 method: EB: (.267, .629) and NO: (.371, .733)

c) 2-proportion z-test for the difference in proportions: $z = 0.8485$, $p = 0.396$ (2-sided), no evidence in favor of alternative. Note: You could also make a case that this should be a 1-sided z-test in which case the p-value would be 0.198.

d) No, we are now considering the data as successes or failures so that we can carry out a test or interval for proportions. The data are now categorical and no assumption of normality is required.

5)

a) $t = 2.5$, $p = .012$, one-sided one-sample t -test. Strong evidence for claim. ($H_0 : \mu = 100$).

- b) One-sample, one-sided matched pairs t -test: $t = .97$, $p = .17$, no.
- c) Use a one-sample, one-sided z -test of proportions with $H_0 : p = 0.5$. Count the number of times IQ went up, out of 15, throwing out the 1 tie. The numbers are a bit small but we get 8 out of 14 which yields $z = .53$ and $p\text{-value} = .296$. There's no evidence to support the claim.
- d) Test whether mean of IQ before is 100: $t = 2.5$, $p = .025$ with 2-sided 1-sample test.
- e) No, $r = .24$.

6)

- a) One-sided one-sample t -test using GPAs of only students A-M: $t = 5.07$, $p = .0001$, strong evidence.
- b) One-sided two-sample t -test: $t = 2.14$, $p = .029$, moderate evidence of higher workload for completers.
- c) Use regression: $(.5)(-2.7) = -1.4$ hours lower for the one with the higher GPA.
- d) Plot the scatterplots for both groups (put the first as Plot 1; put the second as Plot 2 with a different symbol). The new point falls squarely in one group. Which is it?

7)

- a) (133.61, 145.19). Check conditions for 1-sample t interval. "We are 95% confident that the true mean stopping distance on dry pavement for the tire model tested is between 133.61 and 145.19 ft."
- b) 2-sample T -test because the data are not paired (it's a completely randomized experiment, not a matched pair experiment). Results: $t = 11.64$ and $p = 8.03 \times 10^{-9}$. Show checks of conditions for both. Interpretation: The data provide strong evidence against the null hypothesis of no difference in average stopping distance in favor of the alternative hypothesis that the average stopping distance is longer on wet pavement. If there were really no difference in stopping distances under the two conditions, we would virtually never see a t test statistic this extreme.