

Stat 515 — Practice Final Exam: Topic & Point Summary

Ott & Longnecker, 7th ed. | Chapters 4, 5, 6, 7, 8, 10, 11 — Probability, Sampling Distributions, Confidence Intervals, Hypothesis Testing, Variances, ANOVA, Categorical Data, Regression

#	Topic & Context	Points	Chapter — Section (pages)
1	Discrete Random Variable — mode, tail probability, expected value, standard deviation (weekly software crashes)	10	Ch. 4 — §4.6–4.7 (pp. 164–167)
2	Normal Distribution & Sampling Distribution of $\bar{x}$ — proportion above a cutoff; probability for a sample mean (adult cholesterol, $n = 9$)	10	Ch. 4 — §4.10 (pp. 180–187); §4.12 CLT (pp. 190–200)
3	Binomial & One-Sample Test for a Proportion — expected count, binomial probability formula, z-test at $\alpha = 0.05$ (first-generation students, $n = 150$)	10	Ch. 4 — §4.8 (pp. 167–177); Ch. 10 — §10.2 (pp. 483–491)
4	Definition — p-value (observed significance level)	3	Ch. 5 — §5.6 (pp. 257–260)
5	Concept check — Type II error & power; unbiasedness and the effect of n on CI width; interpreting a CI for $\mu_1 - \mu_2$ (commute times); recognizing when a chi-square test for independence applies	12	Ch. 5 — §5.4–5.6 (pp. 242–260); Ch. 6 — §6.2 (pp. 303–315); Ch. 10 — §10.5 (pp. 508–515)
6	Paired Data — independent vs. dependent samples; hypotheses for μ_d ; paired t statistic and df (5K times before/after training, $n = 8$)	8	Ch. 6 — §6.4 (pp. 325–329)
7	Two-Sample t-Test (pooled) & F-Test for Equal Variances — hypotheses, pooled variance, t-test at $\alpha = 0.05$; then $F = s^2_{\max}/s^2_{\min}$ at $\alpha = 0.10$ to check the equal-variance assumption (laptop battery life, $n_1 = 15$, $n_2 = 12$)	16	Ch. 6 — §6.2 (pp. 303–315); Ch. 7 — §7.3 (pp. 376–382)
8	One-Way ANOVA — completing the ANOVA table, hypotheses, F-test conclusion (four fertilizer treatments, $n = 32$)	11	Ch. 8 — §8.2 (pp. 403–412); AOV conditions §8.4 (pp. 414–418)
9	CI for Two Proportions — 95% CI for $p_1 - p_2$ and conclusion (drug side-effect rates, $n_1 = 200$, $n_2 = 180$)	8	Ch. 10 — §10.3 (pp. 491–501)
10	Simple Linear Regression — slope interpretation, t-test for β_1 , R^2 interpretation, prediction and the danger of extrapolation (exercise hours vs. resting heart rate, $n = 30$)	12	Ch. 11 — §11.2–11.4 (pp. 564–581); R^2 & correlation §11.6 (pp. 587–598)

#	Topic & Context	Points	Chapter — Section (pages)
	SUBTOTAL (Q1–Q10)	100	
Bonus	Chi-Square Test for Independence — computing expected frequencies, χ^2 statistic, df, and conclusion (class standing vs. study location, $n = 250$)	10	Ch. 10 — §10.5 (pp. 508–515)
	TOTAL (with bonus)	110	

What to review

- Ch. 4 — Discrete distributions: mode, $E(X) = \sum xP(x)$, $\sigma^2 = E(X^2) - \mu^2$; the binomial pmf and mean np . Normal calculations for a single observation vs. for $\bar{x}$ — remember to divide σ by $\sqrt{n}$ for the sample mean.
- Ch. 5 — What a p-value is and is not (it is not $P(H_0 \text{ true})$); Type I vs. Type II error and how n affects power.
- Ch. 6 — Telling independent samples from paired data, and choosing the pooled two-sample t vs. the paired t accordingly.
- Ch. 7 — Testing whether two population variances are equal: $F = s_{\max}^2/s_{\min}^2$, its two degrees of freedom, and why this check matters before pooling in a two-sample t -test. Unlike the t -test, the F -test is not robust against non-normality.
- Ch. 8 — Reading and completing an ANOVA table: df, $MS = SS/df$, $F = MST/MSE$, and what a significant F does (and does not) tell you.
- Ch. 10 — Large-sample conditions for proportions ($np \geq 5$), the two-proportion CI, and expected counts in a contingency table.
- Ch. 11 — Reading regression output (Coef, SE Coef, $T = \text{Coef}/SE$, S , $R\text{-Sq}$), interpreting the slope and R^2 in context, and why extrapolation is not justified.
- Throughout — Define parameters in words before using symbols, check the assumptions behind each procedure, and state conclusions in the context of the problem, not just "reject H_0 ."

Format notes

Closed book, closed note. A non-programmable, non-graphing calculator and the standard z , t , F and χ^2 tables are permitted. Show all work for full credit.