E370 Course Work Book
Concept Question Hints
Lessons One through Ten

Lesson I

Concept 1. Think summary
Concept 2. Think imbedded.
Concept 3. Think about if both are possible in either time period.
Concept 4. Think what they are composed of.
Concept 5. Where do you see statistics in your life?
Concept 6. Have you ever compared yourself to another?
Concept 7. Check class notes.

Lesson II

Concept 1. Compare and contrast.
Concept 2. Think about a "mean zip code".
Concept 3. Webster's Collegiate Fifth Edition: Hierarchy: "a series of objects or items logically divided or classified in ranks or orders."
Concept 4. Compare male/female to good/better/best.
Concept 5. Think about measuring genders.
Concept 6. How do they differ?
Concept 7. Webster's Collegiate Fifth Edition: Bias: "a propensity, tendency or prejudice; applies particularly to the judgment, through which it is regarded as acting with permanent force on the character." Dictionary of Statistics: Bias: "the error that may distort a statistical result in one direction."
Concept 8. Text p 34, WB p 6.
Concept 9. Text p 37.
Concept 10. Text p 41.
Concept 11. Text p 39.
Concept 12. WB p 7.

Lesson III

Concept 1. Text p 71
Concept 2. Text p 70-72.
Concept 3. Think about overlapping.
Concept 4. Think about left overs.
Concept 5. Check your lab manual, Chapter Two for help.
Concept 6. Did you try several different classes and decide which one revealed the characteristics of the data set best? Describe your process.
Concept 7. What is a relative frequency and where are frequencies on a graph of this kind?
Concept 8. Think about cumulative Final Exams.
Concept 9. Compare the pictures to the data set. Do you think they agree?
Concept 10. See above.
Concept 11. Text p. 71.
Concept 12. Think about symmetry and bin width.
Concept 13. What weaknesses do histograms have?

Lesson IV

Concept 1. Think about percentiles.
Concept 2. Generalize the definition.
Concept 3. Consider strengths and weaknesses of each. Try to make a table.
Concept 4. Class notes.
Concept 5. Class notes.
Concept 6. What is balanced?
Concept 7. Think of this as a different kind of balance.

Concept 8. I'm sure you know what it means to be popular!
Concept 9. What must be true about the center of such distributions? Think about stability.
Concept 10. 27.55
Concept 11. See above.
Concept 12. What does it mean to "estimate?"

Lesson V

Concept 1. Make a list of all the synonyms you can think of for "difference".
Concept 2. Square the differences between values and mean, then average them.
Concept 3. What is a "squared year" anyway?
Concept 4. Think symbols, think words, what does "population" mean? (All. . .)
Concept 5. Think about distance.
Concept 6. Built in reference point; 33% can be as few as 1 out of 3.
Concept 7. See class notes and WarmUps.
Concept 8. 13.18
Concept 9. What does it mean to "estimate?"
Concept 10. Compare measures of center to measures of spread. What does each tell you?
Concept 11.

Summary Statistic Behavior		
Xi	Xi + 7	2Xi
1	8	2
4	11	8
10	17	20
11	18	22
14	21	28
μ= 8	μ = 15	μ= 16
range = 13	range = 13	range = 26
σ2 = 22.8	σ2 = 22.8	σ2 = 91.2
σ = 4.77	σ = 4.77	σ = 9.55

Lesson VI

Concept 1. 20% vs 48%
Concept 2. What is a range? Think about what you know *for sure* in the grouped data set.
Concept 3. This looks strangely familiar. See previous lesson.
Concept 4. This looks strangely familiar. See previous lesson.
Concept 5. 200% vs 244%.
Concept 6. Noodle around and think SMALL.
Concept 7. See WarmUps.
Concept 8. Remember, symmetry means one side is the same as the other starting at the center, so how much probability is above the mean?
Concept 9. WarmUps, again.

Lesson VII See the file of answers to Lesson 7 Concept Questions on the web site.

Lesson VIII The answers are found in the Lesson 8 file on the web site.

Lesson IX

Concept 1. Remember, probability distributions are thought of as calculated over the very long run?
Concept 2. An average is a "typical" value, so . . .?
Concept 3. See number 2, above.
Concept 4. Remember collectively exhaustive? Well . . . .

$$V(X) = \sum_i \left(X_i - E(X)\right)^2 * P(X_i)$$

$$V(2X) = \sum_i \left(2X_i - 2E(X)\right)^2 * P(X_i)$$

Concept 5.

$$= \sum_i \left(2 * (X_i - E(X))\right)^2 * P(X_i)$$

$$= \sum_i 2^2 * \left(X_i - E(X)\right)^2 * P(X_i)$$

Concept 6. Compare formulas. What structures are the same? Which structures are different? How does sample or population size get transformed into probability?

Concept 7. See hints for #6 above.

Concept 8. What are the rules? How much probability?

Concept 9.
A. ° Fahrenheit =38.5 * 9/5 + 32 = 101.3
B. ° Fahrenheit =37 * 9/5 + 32 = 98.6
C. ° Fahrenheit = ° Celcius * 9/5 + 32 ==> V(° Fahrenheit) =V(° Celcius * 9/5 + 32)
=V(0.08*9/5)+V(32)
=(9/5)^2*(0.08) + 0 = 0.2592

Lesson X

Concept 1. This is personal, but here is an example: Total yards gained in a football game are rushing yards plus passing yards: TY = RY + PY. TY is distributed with a center that is the sum of the centers of RY and TY, and a spread that is the sum of the spreads of RY and TY plus any spread due to RY's relationship to TY. (I suspect that is a negative relationship.)

Concept 2. Positive, add, clearly not independent.

Concept 3. Negative, subtract, clearly not independent.

Concept 4. My calculus professor always used to say that zero is a number killer.

Concept 5. Sum the expected values of the parts.

Concept 6. Sum all the variation you can think of and account for.

Concept 7. Since we are summing, we just keep adding.

Concept 8.
A. See #1 above! E(TY) = 369.7; V(TY) = 4905.2
B. $TP = 6*TD + 1*XP_K + 2*XP_R + 3*FG$
E(TP) = 117.8 (This seems very unlikely! I wonder if USAToday changed horses in mid-stream. I assumed that the numbers in the table were average counts, but some of them may be average points. That also seems unlikely. In any case, that is the number the calculation comes to.)
V(TP) = 2024.8 (Yeesh! These games must be exciting!) Remember that you must have 1 covariance term for every PAIR of variables. Since there are 4 variables, I had 6 covariance terms!