Suggested Answers for WarmUps for Lesson Ten	
The first 4 questions are scored for accuracy, the remaining for sincerity, thoughtfulness and originality.	
1.	What is the difference between an expected value of a random variable and a mean of a variable?
Answer	Operationally, there is little difference between the two, because they are both used for the same thing, as a descriptor of the center of a distribution. The method by which they are calculated is identical if one compares the formula for a weighted mean to that of the expected value. The difference lies in the nature of the data. Random variables, because they are subject to chance, depend on probabilities to describe their distribution, where other variables are essentially from fixed data sets.
2.	To what idea does the word "expected" refer when used attached to a descriptor of a random variable?
Answer	“Expected” refers to the fact that the variable being described is a random variable and is, thus, uncertain. While the mean of a set of fixed data is an absolute, unchanging and unique value, the center of a distribution of a random variable is uncertain and possibly changeable. “Expected” values are calculated to be a descriptors for a random variable assuming that the probability distribution describing it is a long run distribution (it will not change in the foreseeable future) and thus the calculated value will be what we would “expect” given this assumption.
3.	What are the expected value and variance of 6.3? Why?
Answer	E(6.3) = 6.3 V(6.3) = 0 6.3 is a constant. Because they are unchanging, we expect the value of the constant to be what it is, in this case 6.3. Again, because 6.3 is a constant, thus unchanging, it does not vary and hence has a variance of 0.
4.	The expected variance of a variable defined as 3.5X is 12.25*V(X). What did we observe when we looked at measures of dispersion which prepared us for this fact?
Answer	We observed that when a constant was multiplied over every value in a data set the variance of the original data set changed by the square of that constant.
5.	Give an original example of a new variable created by the combination of two or more variables that you are interested in. Explain your example in words and why you think the variables should be combined.
Answer	One (or maybe it is actually two) example is: Monthly living expenses are a function of (at least) costs for housing, food, clothing, auto operation and health care. Each of the components of the living expenses is a variable in its own right. For example, housing costs would include rent or mortgage, electricity, gas, water, telephone, cable and insurance. While some of these values are fixed, others depend directly on usage and thus vary. In order to build a budget that is functional, the distribution of the variable components must be estimated.
	We pretty much discounted covariance when we looked at it next to correlation and the least squares line. In Lesson 10 a new use is made of covariance. What is it

6.	used for or what does it accomplish?
Answer	The covariance term completes the calculation of a variance of a linear combination and represents the variability of the interaction of the variables being combined.
7.	(I translated from the Excel notation.) In math class, when you squared (aX + bY) you got [(a^2X^2) + 2abXY + (b^2Y^2)]. Explain how this result compares to the formula for the variance of a linear combination of two variables.
Answer	The only difference in the two functions is that the variables X^2 and Y^2 would actually be V(X) and V(Y) (both of which are squared, remember), and XY would be Cov(X,Y). The origin of the squared constants on the variables and of the 2ab on the covariance are obvious from this comparison.
8.	How does the sign of a covariance term affect the variance of a combination of two variables? What do we learn from the sign?
Answer	If there is no interaction (Cov=0), covariance contributes nothing, however, negative covariances serve to reduce variability, while positive ones increase variability. Additionally, we learn the direction of the relationships described.