

COMPUTER SCIENCE 20, SPRING 2012  
DISCRETE MATHEMATICS FOR COMPUTER SCIENCE

Class #28 (Statistics)

**Homework, due in hard copy Wednesday 4/18/2012 at 10:10am**

1. Your financial advisor tells you about two possible investment options for your \$1000. The first option is investing in Apple shares. The Apple shares have a 80% chance of doubling in value and a 20% chance of losing all of their value. The second option is called a *principal guaranteed* purchase of the Apple shares. In this scenario, even if the shares lose their value you still get back the original money you invested in Apple. However, the guarantee costs a **non-refundable** fee,  $x$ , so that the amount you can invest in the Apple shares is only

$$\$1000 - x$$

- (a) What is the value of  $x$  so that the two options have the same expected return?
  - (b) Assume the fee is the value you found above, so that the two options have the same expected return. Which of the two options has a higher variance on the return?<sup>1</sup>
2. Suppose a particular subset of CS 20 students had the following scores for the first two homework assignments:

$$\langle (0, 3), (6, 6), (4, 5), (7, 8), (8, 8) \rangle$$

That is, some student scored 0 on the first homework and 3 on the second homework; another scored 6 on the first homework and 6 on the second homework, etc.

- (a) Compute the following quantities for the two homework assignments, *separately*. For example, compute the sample mean of the scores on the *first* homework and then the mean of the scores on the *second* homework, and write them both down where it asks for the mean.
  - i. mean
  - ii. variance
  - iii. standard deviation (to 2 decimal places)
  - iv. median

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<sup>1</sup>People who would choose the option with the lower variance are called *risk-averse*. People who would choose the option with the higher variance are called *risk-seeking*. People who are neutral are called *risk-neutral*.

- (b) So far we have only computed quantities relating to the two homeworks separately. To gain some insight into how they vary together, compute the sample covariance and correlation coefficient (to 2 decimal places) of the score on the first homework with the score on the second homework. Provide an interpretation of the correlation coefficient (one sentence only, please!).