

Lecture 3 Written Homework. *Due 10pm Fri Feb 26, via Gradescope.com.*

- (1) Latouch claims that she can distinguish between Coke and Pepsi 75 percent of the time. Tawna bets that she cannot and, in fact, just guesses. To settle this, they make a bet: Latouch is to be given ten small glasses, each having been filled with Coke or Pepsi, chosen by tossing a fair coin. She wins the bet if she gets seven or more correct. Find the probability that Latouch wins if she has the ability she claims. Find the probability that Tawna wins if Latouch is guessing.
- (2) Dr Venkman claims he has extrasensory powers and can tell which of two symbols is on a card turned face down. To test his ability he is asked to do this for a sequence of trials. Let the null hypothesis be that he is just guessing, so that the probability is $1/2$ of his getting it right each time, and let the alternative hypothesis be that he can name the symbol correctly more than half the time. Devise a test with the property that the probability of a type I error (concluding Venkman is a fraud when he is in fact psychic) is less than 0.05 and the probability of a type II error (concluding Venkman is a psychic when he is in fact a fraud) is less than 0.05 if Venkman can name the symbol correctly 70 percent of the time.

To receive full credit you must show your work and explain your reasoning.

If you write a program to solve a problem, include the source code and explain it.