Mustard versus Ketchup You perform a survey to find out whether people prefer mustard (M) or ketchup (K) on their hamburger bun. Assume that everybody chooses precisely one of the two condiments. You interview 100 people and 10 of them prefer mustard.

(1) Show that there are 17,310,309,456,440 ($= 2 * 11 * 98 * 97 * 95 * 94 * 31 * 23 * 13$) "words" with 10 Ms and 90 Ks.
(2) If 5% of the total population actually prefers mustard, what is the probability that the first 10 people you interview prefer mustard and the remaining 90 people prefer ketchup?
(3) If 5% of the total population actually prefers mustard, what is the probability that precisely 10 of the people you interview prefer mustard?
(4) If 10% of the total population actually prefers mustard, what is the probability that the first 10 people you interview prefer mustard and the remaining 90 people prefer ketchup?
(5) If 10% of the total population actually prefers mustard, what is the probability that precisely 10 of the people you interview prefer mustard?
(6) You want to make a statement about the percentage of the population that prefers mustard. For example, mustard is preferred over ketchup as a condiment on hamburger buns by 10% of the people with a $\pm 3\%$ error margin. With how much confidence can you say this?
(7) Suppose you want to give a percentage range for people preferring mustard with 98% confidence. What should it be?