

Math 55 Section 101 Quiz 8

Note You can leave your final answers in unsimplified form (no need to break out a calculator).

Problem 1 You and your friend have 4 coins that you want to divide between the two of you. You both decide to play a game: you will flip the coins. If there are an even number of heads, your friend get the coins and if there are an odd number you get the coins.

1.A (3 pt) First suppose the coins are fair: they all have a $1/2$ chance of flipping heads. Who has a better chance of winning?

1.B (3 pt) Now suppose that the coins are *not* fair: they all have a $1/10$ chance of being heads. Who has a better chance of winning?

Problem 2 (4 pt) This seasons flu is going around, and you've caught it. You go to your doctor and ask if you'll be sick for more than a week. He says that about 50 percent of flu patients are sick for more than a week. However, he also observes that you have developed a fever; 80 percent of his patients that are sick for more than a week develop a fever, while only 20 percent of those who are sick for less than a week develop one. Given that you have a fever, what are your chances of being sick for more than a week? (Answer on the back).

Bonus (0 pt but interesting) Consider the setup in Problem 1 again. Suppose now that the coins have a q chance of being heads, where $0 \leq q \leq 1$. Show that the $q = 1/2$ gives you the best chance of winning. That is, show that $q = 1/2$ maximizes your chances at winning among all permissible q .