

Social*Networks

QUIZ #6

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Q1. [5] You need to check that your friend, Bob, has your correct phone number but you cannot ask him directly. You must write the question on a card and give it to Alice who will take the card to Bob and instruct him to follow the message. What must you write on the card, besides the question, to ensure Bob can give you the correct response so that Alice cannot read your phone number?

SOLN.1 *Since you are just "checking," you ask him to call you at a certain time and hang up after exactly 3 rings. If this doesn't happen exactly as instructed, he doesn't have your number.*

Q2. [5] You're the captain of a pirate ship and your crew gets to vote on how the gold is divided up. If fewer than one third of the pirates agree with you, you die. How do you recommend apportioning the gold in such a way that you get a good share of the booty, but still survive?

SOLN.2 *Assume that you have N pirates in your crew. You divide the booty evenly between the top $\lceil (N + 1) / 3 \rceil$ of the crew.*

Q3. [10] You are given 2 egg and access to a 100-story building. Eggs can be very hard or very fragile – meaning that it may break if dropped from the first floor or may not even break if dropped from 100th floor. Both eggs are identical. You need to figure out the highest floor of a 100-story building an egg can be dropped without breaking. How many drops do you need to make? You are allowed to break just 2 eggs in the process.

SOLN.3 *The maximum egg drops for this method is 14 times. Instead of partitioning the floors by 10, start at the 14th floor, and then go up by 13 floors, then by 12, then 11, then by 10, 9, 8, 7, 6, 5, 4 until you get to the 99th floor, then here. If the egg were to break at the 100th floor, it would take 12 drops (or 11 if you assume that it would break at the 100th floor). Say, for example, that the 49th floor was the highest floor, the number of drops would be the 14th, 27th, 39th, 50th (the egg would break on the 50th floor) plus the 40, 41, 42, 43, 44, 45, 46, 47, 48, and 49th floor for a total of 14 drops.*