

MATH CLUB: MISCELLANEOUS PROBLEMS

OCT 22, 2017

1. A box contains exactly five chips, three red and two white. Chips are randomly removed one at a time without replacement until all the red chips are drawn or all the white chips are drawn. What is the probability that the last chip drawn is white?

What would change if instead of 3 reds, 2 whites you had k reds and l whites?

2. Let $f(x) = x^2 + 12x + 30$. Can you solve

$$f(f(f(f(x)))) = -5.$$

3. A traveler arrives at a hotel. He has a silver chain of 30 links. Each link of the chain is enough to pay exactly for one day stay at the hotel. However, the hotel owner insists on being paid daily: by the end of day k , he must have k links of the chain. How many chain links does the traveler need to break so that he can stay for 30 days?

Note:

1. A broken chain link is worth as much as an unbroken one
 2. The hotel owner can give change — but only using the chain links he had received on previous days.
4. An explorer finds himself locked in an underground dungeon, consisting of many rooms arranged in a circle: each room has two doors, leading to rooms on either side of it. All rooms are identical; in each room there is a light with a switch, so you can turn the light on or off. Can you figure a way for the explorer to find how many rooms are in the dungeon, without making any marks in the rooms, just by visiting the rooms and turning the light on and off?