

CHAMP: Reasoning Challenges

Exercise 1. Card game!

A casino offers a card game using a normal deck of 52 cards. The rule is that you turn over two cards each time. For each pair, if both are black, they go to the dealer's pile; if both are red, they go to your pile; if one is black and one is red, they are discarded. The process repeats until you go through all 52 cards. If you have more cards in your pile, you win the not-yet-released Beyoncé album; otherwise (including ties) you get nothing.

What are the chances that you win the Beyoncé album?

Exercise 2. Birthdays!

What are the chances that two of the people in our classroom share the same birthday?

Exercise 3. Tigers and a gazelle!

One hundred tigers and one gazelle are put on a grass-covered magic island. The animals on the island follow these rules.

- (a) Tigers can eat grass, but they would rather eat gazelles.
- (b) At any given time, only one tiger can eat one gazelle. If a tiger eats a gazelle, that tiger then *turns into a gazelle*.
- (c) All tigers are smart, perfectly rational, and want to live.

Will the gazelle be eaten?