

Suppose we choose 4 balls at random from a box of 8 balls, 4 Red and 4 Blue.

(1) What is the probability that 2 are Red and 2 are Blue?

$$\frac{\binom{4}{2}^2}{\binom{8}{4}} = \frac{6^2}{70} = \frac{18}{35}$$

(2) What is the probability that there are more Red balls than Blue balls?

$$\frac{1}{2} \left(1 - \frac{\binom{4}{2}^2}{\binom{8}{4}} \right) = \frac{\binom{4}{3} \cdot \binom{4}{1} + \binom{4}{4} \cdot \binom{4}{0}}{\binom{8}{4}} = \frac{17}{70}$$

(3) What is the probability that there are more Blue balls than Red balls? *same answer*

Challenge questions for extra credit:

(A) write answers to (1), (2), (3) as simple fractions. *done above*

(B) what is the sum of these three numbers? **1**

(C) Suppose 1/10 of the population are infected by a virus at random. What is the probability that a group of 15 people will have at least one infected person?

$$1 - \left(\frac{9}{10} \right)^{15}$$

Note: using a calculator, this is $\frac{794108867905351}{1000000000000000} = 0.794108867905351$ but this answer is not part of the quiz.

End of the quiz