

Oluwakemi Omotunde

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Assignment #6 Problem Set #1

1) When you roll a fair die 3 times, how many possible outcomes are there?

outcomes for 1 die = 6

$$\text{outcomes for 3 dice} = 6 \times 6 \times 6 = \boxed{216}$$

2) What is the probability of getting a sum total of 3 when you roll a die 2 times?

first roll \Rightarrow $P(1) = \frac{1}{6}$
 $P(2) = \frac{1}{6}$

second roll \Rightarrow $P(2) = \frac{1}{6}$
 $P(1) = \frac{1}{6}$

$\frac{1}{36}$

First Die	Second Die
1	2
2	1

2 ways possible

$$\frac{1}{36} + \frac{1}{36} = \frac{2}{36} = \boxed{\frac{1}{18}}$$

3) Assume room of 25 strangers. What is the probability that 2 of them have the same birthday? Assume all birthdays are equally likely & equal to $\frac{1}{365}$ each. What happens to this probability when there are 50 people in the room?

formula: $\frac{365!}{(365-n)! \cdot 365^n}$

w/ $n = 25$ for none having same birthdays

$$= \frac{365!}{365! \cdot 365^n} \Rightarrow \frac{365!}{365! \cdot 365^{25}} = \frac{2.51 \times 10^{77}}{5.1 \times 10^{74} \cdot 1.14 \times 10^{64}} = \frac{2.51 \times 10^{77}}{5.814 \times 10^{78}}$$

= .43

$1 - .43 \approx .56$ when $n = 25$

when $n = 50$, the probability will increase.