Probability Examples Related to Combinations Data Science and A.I. Lecture Series

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One red and one black card.

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One red and one black card. Both cards of the same suit.

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One red and one black card.

- Both cards of the same suit.
- One jack and one king.

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One red and one black card.

- Both cards of the same suit.
- One jack and one king.
- One red card and one card of a club.



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- One red and one black card.
- 2 Both cards of the same suit.
- 3 One jack and one king.
- One red card and one card of a club.

Solution:

• Total ways to draw two cards:

$$\binom{52}{2} = \frac{52 \times 51}{2} = 1326$$

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- One red and one black card.
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- One red card and one card of a club. 4

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(i) One red and one black: ۲

$$\binom{26}{1} \times \binom{26}{1} = 26 \times 26 = 676 \quad \Rightarrow \quad P = \frac{676}{1326}$$

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$$4 \times \binom{13}{2} = 4 \times \frac{13 \times 12}{2} = 312 \quad \Rightarrow \quad P = \frac{312}{1326}$$

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$$\binom{4}{1} \times \binom{4}{1} = 4 \times 4 = 16 \quad \Rightarrow \quad P = \frac{16}{1326}$$

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• (iv) One red card and one card of a club:

$$\binom{26}{1} \times \binom{13}{1} = 26 \times 13 = 338 \quad \Rightarrow \quad P = \frac{338}{1326}$$

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If the letters of the word STATISTICS are arranged randomly, find the probability that all three T's are together.

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• Probability:

$$P = \frac{\frac{8!}{3! \cdot 2!}}{\frac{10!}{3! \cdot 3! \cdot 2!}} = \frac{8! \cdot 3!}{10!} = \frac{6}{15} = \frac{2}{5}$$

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• Total ways to choose 6 numbers out of 30:

$$\binom{30}{6} = \frac{30 \times 29 \times 28 \times 27 \times 26 \times 25}{6!} = 593775$$

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$$P = \frac{1}{593775}$$

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Thank You!

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