

10.3/10.4 Combinations/Probability

Probability: $\frac{\# \text{ of desired outcomes}}{\# \text{ of total outcomes}}$

Permutation: arrangement of objects in a specific order

ex: ${}_5P_3 = \frac{5!}{(5-3)!} = \frac{5!}{2!} = 60$

Apr 11-8:01 AM

Combinations: arrangements of objects (order doesn't matter)

$$C(n, r) = {}_nC_r = \binom{n}{r} = \frac{n!}{r!(n-r)!}$$

ex: ${}_5C_3 = \frac{5!}{3!(5-3)!} = \frac{5!}{(3!2!)} = 10$

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EX

$$1. \quad 12 C_8 = \frac{12!}{8!(12-8)!} = \frac{12!}{8!4!} = 495$$

$$2. \quad \underset{\text{gum}}{5 C_2} \cdot \underset{\text{candy}}{6 C_3} = \frac{5!}{2!(5-2)!} \cdot \frac{6!}{3!(6-3)!} = 200$$

$$3. \quad \frac{\# \text{ desired}}{\# \text{ possible}} = \frac{5 C_1 \cdot 3 C_1}{8 C_2} = \frac{5 \cdot 3}{28} = \frac{15}{28}$$

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Inclusive Events: events that can happen at the same time.

Mutually Exclusive Events: events that can't happen at the same time.

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Probabilities

Exclusive:

$$P(A \text{ or } B) = P(A) + P(B)$$

$$P(\text{rolling } 3 \text{ or rolling } 4) = \frac{1}{6} + \frac{1}{6} = \frac{2}{6}$$

ex $P(\text{doubles or } 9) = P(\text{doubles}) + P(9)$

$$= \frac{6}{36} + \frac{4}{36} = \frac{10}{36} = \frac{5}{18}$$

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Inclusive

$$P(A \text{ or } B) = P(A) + P(B) - P(A \& B)$$

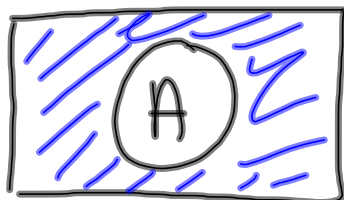
ex $P(\text{doubles or } 8)$

$$= P(\text{doubles}) + P(8) - P(\text{both})$$

$$= \frac{6}{36} + \frac{5}{36} - \frac{1}{36} = \frac{10}{36} = \frac{5}{18}$$

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Compliment of A = A^c



$$P(A^c) = 1 - P(A)$$

$$P(A) + P(A^c) = 1$$

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EX 1. $P(5 \text{ or } 6) = P(5) + P(6) = \frac{1}{6} + \frac{1}{6}$
 $= \frac{2}{6} = \frac{1}{3}$

2. $P(\text{greater than 2 or a 6})$

$$P(\text{greater than 2}) + P(6) - P(\text{both})$$

$$\frac{4}{6} + \frac{1}{6} - \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$$

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$$3. A. P(\text{sum } 8 \text{ or sum } 12)$$

$$P(\text{sum } 8) + P(\text{sum } 12)$$

$$\frac{5}{36} + \frac{1}{36} = \frac{6}{36} = \frac{1}{6}$$

$$B. P(\text{greater } 2) + P(\text{greater } 6) - P(\text{both})$$

$$\frac{35}{36} + \frac{21}{36} - \frac{21}{36} = \frac{35}{36}$$

$$C. P(\text{greater } 8) + P(\text{less } 6)$$

$$\frac{20}{36} + \frac{10}{36} = \frac{30}{36} = \frac{5}{6}$$

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$$6. a. P(E) = \frac{1}{3}$$

$$P(E^c) = 1 - \frac{1}{3} = \frac{2}{3}$$

$$b. P(E) = .782$$

$$P(E^c) = 1 - .782 = .218$$

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8. at least 2 heads
exactly 2 heads? = $\frac{3}{8}$
* 2 or 3 heads

$$\frac{4}{8} \text{ or } \frac{1}{2}$$

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Apr 11-9:00 AM