

Q #4.

The Addition Rule

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

1. Consider drawing a single card from a standard deck. Decide whether each pair of events is mutually exclusive:

(a) Event A = Drawing a King
Event B = Drawing a Queen → mutually exclusive

(b) Event A = Drawing a Red Card
Event B = Drawing an Ace → not mutually exclusive

1 1 1 1
3 4 5 6
2 2 2 2
1 2 3 4 5 6
2. When rolling 2 dice, what's the probability that their sum will be either a 7 or an 11?
 $P(7 \text{ or } 11) = P(7) + P(11)$
 $P(7 \text{ or } 11) = 8/36 = 2/9$
 $= 6/36 + 2/36$

3 3 3 3
2 3 4 5 6
4 4 4 4
1 2 3 4 5 6
An iPod has 150 dance songs, 215 songs that are longer than four minutes, and 55 songs that are both dance songs and longer than for minutes. If this iPod has 1000 songs total and you set it on random, what is the probability that the next song will be a dance song or a song that is longer than four minutes?
 $P(\text{dance or } > 4 \text{ minutes}) = P(\text{dance}) + P(> 4 \text{ min}) - P(\text{both})$
 $= \frac{150}{1000} + \frac{215}{1000} - \frac{55}{1000} = 310/1000$
 $P(\text{dance } < 4 \text{ min}) = 31\%$

4. On May 31, 1997, there were 487,297 personnel on active duty in the U.S. Army. Of these, 70,690 were women, 67,986 were commissioned officers, and 9,716 were women commissioned officers. What is the probability that a randomly selected member of the U.S. Army on this day was:
 $P(\text{neither man nor}) = 1 - P(\text{woman } + \text{CO})$

(a) Neither a woman nor a commissioned officer?
 $P(\text{woman } + \text{CO}) = \left(\frac{70690}{487297}\right) + \left(\frac{67986}{487297}\right) - \left(\frac{9716}{487297}\right)$
man - 416607 both - 58270 (87.5%) (73.5%)

5. In a certain elementary school class, a survey is given and we find that: $\frac{1}{3}$ of the children like hot dogs, $\frac{1}{2}$ of the children like pizza, and $\frac{3}{4}$ of them like hot dogs or pizza. If a student is selected at random from this class, what is the probability that he or she likes both hot dogs and pizza?
• 264643534
= 73.5%

$P(\text{HD} + \text{P}) = P(\text{HD}) + P(\text{P}) - P(\text{Both})$
 $(3/4) = (1/2) + (1/3) - P(\text{Both})$
 $(3/4) = 5/6 - P(\text{both})$
-5/6 -5/6
-1/2 = -P(both)
 $P(\text{both}) = 1/12$