

Probability - Additional Problems

$\frac{50 \text{ men}}{82}$   
 $\frac{39 \text{ ticketed}}{82}$

- In a study of 82 young drivers, 50 men and 32 women, 39 of the men had received a ticket, while only eight of the women had received a ticket. If one of these drivers is selected at random:
  - What is the probability it is a man or someone who had received a ticket?  $\frac{50}{82} + \frac{8}{82} = \frac{58}{82} = \frac{29}{41}$
  - What is the probability it is a woman or someone who had not received a ticket?  $\frac{32}{82} + \frac{11}{82} = \frac{43}{82}$
- In the US Senate, there are 59 Democrats and 41 Republicans. If three senators are chosen at random to represent the US on a diplomat mission, what is the probability that
  - All are Democrats?  $\frac{59}{100} \cdot \frac{58}{99} \cdot \frac{57}{98} = \frac{32509}{101780} = 20.19\%$
  - Two are Democrats and one is a Republican?  $\frac{59}{100} \cdot \frac{58}{99} \cdot \frac{41}{98} = \frac{70151}{485100} = 14.5\%$
- Thirty six US Senate seats are up for election this Fall. If a committee of four senators is being formed, what is the probability that:
  - All will be from seats that are up for election?  $4C_4 \left(\frac{36}{100}\right)^4 \left(\frac{64}{100}\right)^0 = \frac{6561}{390625} = 1.7\%$
  - None of them will be?  $4C_0 \left(\frac{36}{100}\right)^0 \left(\frac{64}{100}\right)^4 = \frac{65536}{390625} = 16.8\%$
- Alarm clocks malfunction 10% of the time. A student who is taking the SATs decides to set three alarm clocks to make sure he gets up on time. What is the probability that at least one of the clocks will work?  $\frac{9}{10} \cdot \frac{9}{10} \cdot \frac{9}{10} = \frac{729}{1000} = 72.9\%$
- A couple plans to have five children. Find the probability they have at least one girl.  
 prob of all boys  $\rightarrow \left(\frac{1}{2}\right)^5 = \frac{1}{32}$   $1 - \frac{1}{32} = \frac{31}{32} = 96.9\%$
- A coin is flipped 3 times. What is the probability of:
  - Three heads  $\frac{1}{8} = 12.5\%$
  - No heads  $\frac{1}{8} = 12.5\%$
- On any given Sunday during football season, the probability that the Giants win is 0.6 and the probability that the Jets win is 0.4. Draw a tree diagram to illustrate all the possible outcomes? [Assume they don't play each other.] Describe each outcome and find its probability.
 

GW	JW	=	.24	GL	JW	=	.16
GW	JL	=	.36	GL	JL	=	.24

$\begin{array}{l} .6 \quad .4 \\ \swarrow \quad \searrow \\ \text{GW} \quad \text{GL} \\ \downarrow \quad \downarrow \\ .4 \quad .6 \quad .4 \quad .6 \\ \text{JW} \quad \text{JL} \quad \text{JW} \quad \text{JL} \end{array}$
- Five cards are drawn from a well-shuffled deck. Find the probability of drawing:
  - All clubs  $\frac{1}{4} \cdot \frac{12}{51} \cdot \frac{11}{50} \cdot \frac{10}{49} \cdot \frac{9}{48} = \frac{33}{66040} = .05\%$
  - All the same suit
  - No face cards  $\frac{40}{52} \cdot \frac{39}{51} \cdot \frac{38}{50} \cdot \frac{37}{49} \cdot \frac{36}{48} = \frac{2109}{8330} = 25.3\%$
  - At least one king  $1 - \left(\frac{48}{52} \cdot \frac{47}{51} \cdot \frac{46}{50} \cdot \frac{45}{49} \cdot \frac{44}{48}\right) = \frac{6221}{8330} = 74.7\%$
- Five equally matched horses are entered in a race: (A,B,C,D,E)
  - What is the probability A wins?  $\frac{1}{5} = 20\%$
  - What is the probability the top 3 finishers are CDE in that order? In any order? Solve using both methods we learned: 1 (combinatorics) and 2 (conditional probability).  
 $\frac{1}{5} \cdot \frac{1}{4} \cdot \frac{1}{3} = \frac{1}{60} = 1.7\%$
- Three different letters are chosen at random from the alphabet.
  - What is the probability that none is a vowel (a, e, i, o, u)?  $\frac{21}{26} \cdot \frac{20}{25} \cdot \frac{19}{24} = \frac{133}{260} = 51.2\%$
  - What is the probability that at least one is a vowel?  $1 - \left(\frac{21}{26} \cdot \frac{20}{25} \cdot \frac{19}{24}\right) = \frac{127}{260} = 48.8\%$