

1. (10pts) A car manufacturer's offerings have been classified into groups in the table according to their starting MSRP price and type.

Type/price	<\$24K	\$24-34K	>\$34K
Car	3	1	2
SUV	2	8	4

If a random vehicle is chosen, what is the probability that it

- a) is an SUV?
 b) has a price under \$24K?
 c) is an SUV priced between \$24K and \$34K?
 d) is a car priced above \$24K?

Total vehicles: 20

a) $\frac{2+8+4}{20} = \frac{14}{20} = \frac{7}{10}$ b) $\frac{3+2}{20} = \frac{5}{20} = \frac{1}{4}$ c) $\frac{8}{20} = \frac{2}{5}$ d) $\frac{1+2}{20} = \frac{3}{20}$

2. (20pts) Write the probabilities and odds against and in favor of the following events (show any work needed below):

Event	probability	odds against	odds in favor
a) Getting a number less than 3 on a roll of one die	$\frac{2}{6} = \frac{1}{3}$	4:2 = 2:1	2:4 = 1:2
b) Picking a bag of corn chips without looking from a shelf holding 5 bags of corn chips and 9 bags of potato chips	$\frac{5}{14}$	9:5	5:9
c) Getting a 5 on exactly one die when rolling two dice	$\frac{10}{36} = \frac{5}{18}$	26:10 = 13:5	10:26 = 5:13
d) Getting sum 3 or 9 on a roll of two dice	$\frac{6}{36} = \frac{1}{6}$	30:6 = 5:1	6:30 = 1:5
e) On one draw, getting a picture card or a club	$\frac{22}{52} = \frac{11}{26}$	30:22 = 15:11	22:30 = 11:15

c) outcomes in E: (5,1), (5,2), (5,3), (5,4), (5,6)
 (1,5), (2,5), (3,5), (4,5), (6,5)

10 outcomes

d) sum=3 (1,2), (2,1)
 sum=9 (3,6), (4,5), (5,4), (6,3) } 6 outcomes

e) $P(\text{picture or club}) = P(\text{picture}) + P(\text{club}) - P(\text{picture AND club})$
 $= \frac{12}{52} + \frac{13}{52} - \frac{3}{52} = \frac{22}{52} = \frac{11}{26}$

3. (4pts) The odds in favor of Fred going bowling next week are 9-to-4. $\frac{4}{9+4} = \frac{4}{13}$

a) What is the probability Fred goes bowling next week?

b) What is the probability Fred doesn't go bowling next week? $\frac{9}{9+4} = \frac{9}{13}$

4. (4pts) In a household, there is a 15% chance that an appliance breaks down in a year.

15 outcomes it breaks down, 85 it doesn't

a) What are the odds in favor of an appliance breaking down in a year? $15:85 = 3:17$

b) What are the odds against an appliance breaking down in a year? $85:15 = 17:3$

5. (8pts) Among 457 outfits in a clothing store, 145 have lime color and 238 have pockets, while 315 have at least one of those features. What is the probability that a randomly chosen outfit from the store

a) has lime color and pockets? *315 have lime color OR have pockets*

b) has neither pockets nor lime color?

$$c) P(\text{lime OR pockets}) = P(\text{lime}) + P(\text{pockets}) - P(\text{lime AND pockets})$$

$$\frac{145+238}{457} = \frac{383}{457} - P(\text{lime AND pockets})$$

$$\frac{383}{457} - \frac{315}{457} = -P(\text{lime AND pockets})$$

$$P(\text{lime AND pockets}) = \frac{68}{457}$$

$$b) P(\text{neither pockets nor lime}) = 1 - P(\text{pockets OR lime}) = 1 - \frac{315}{457} = \frac{457-315}{457} = \frac{142}{457}$$

6. (14pts) A bag contains 8 white socks, 4 red socks and 6 blue socks. Without looking, we draw a sock from the bag twice, returning the sock after the first draw. Write the number of outcomes of this experiment and then compute the probability that

a) The first sock is red and the second sock is blue.

b) At least one of the socks is white.

c) The second sock is blue or the two socks have different colors.

Bag has 18 socks
 $18 \cdot 18 = 324$ outcomes

$$a) P(\text{1st red AND 2nd blue}) = \frac{4}{18} \cdot \frac{6}{18} = \frac{24}{324} = \frac{2}{27}$$

$$c) P(\text{2nd blue OR diff colors}) = P(\text{2nd blue}) + P(\text{diff. colors}) - P(\text{2nd blue AND diff. colors})$$

WR	8	4	32
WB	8	6	48
RW	4	8	32
RB	4	6	24
BW	6	8	48
BR	6	4	24
Sum			208

$$b) P(\text{at least one is white}) = 1 - P(\text{neither is white}) = 1 - \frac{100}{324} = \frac{224}{324} = \frac{56}{81}$$

$$= \frac{108}{324} + \frac{208}{324} - \frac{72}{324} = \frac{244}{324} = \frac{61}{81}$$