Precalc13.3

Find the probability of an event
Find the odds for success and failure of an event

permutation

combination

probability $\frac{S}{T}$

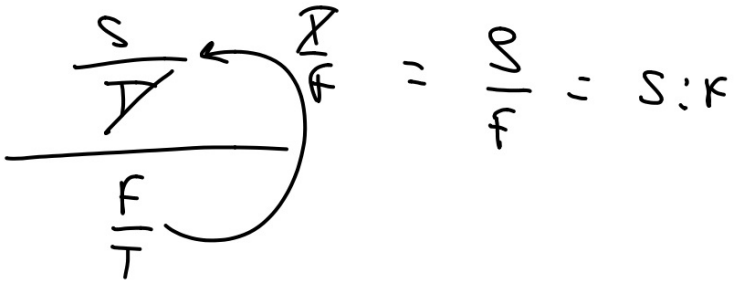
sample space

success

failure

complement

odds $S : F$



activity: P_{cubes}
Odds $_{cubes}$

If an event can succeed in s ways and fail in f ways, then the probability of success $P(s)$ and the probability of failure $P(f)$ are as follows.

$$P(s) = \frac{s}{s+f} \qquad P(f) = \frac{f}{s+f}$$

P_{cubes}

Odds $_{cubes}$

$$P_G = \frac{7}{20}$$

$$P_{not\ G} = \frac{13}{20}$$

$$\frac{7}{20} \div \frac{13}{20}$$

7:13

$_{46}C_5$ $\quad\quad$ $_{42}C_1$

Probability of winning the big jackpot:

$$\frac{46 \cdot 45 \cdot 44 \cdot 43 \cdot 42}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} \cdot 42$$

" Odds of winning the big jackpot: " → $\frac{1}{57,571,668}$

1 : 57,571,667

The odds of the successful outcome of an event is the ratio of the probability of its success to the probability of its failure.

$$\text{Odds} = \frac{P(s)}{P(f)}$$

$\text{Odds}_{\text{cubes}}$

Compare to powerball ticket

Is it probability or odds?
Make sure you answer the right question.
Always start with probability.
(if it's an odds question, you need it anyway...)

28

6 Twelve male and 16 female students have been selected as equal qualifiers for 6 college scholarships. If the awarded recipients are to be chosen at random, what are the odds that 3 will be male and 3 will be female?

3M 3F

$$P(3m\&3f) \quad \frac{{}_{12}C_3 \cdot {}_{16}C_3}{{}_{28}C_6} = \frac{\frac{12\cdot 11\cdot 10}{3\cdot 2\cdot 1}\cdot\frac{16\cdot 15\cdot 14}{3\cdot 2\cdot 1}}{6T\left[\frac{28\cdot 27\cdot 26\cdot 25\cdot 24\cdot 23}{6\cdot 5\cdot 4\cdot 3\cdot 2\cdot 1}\right]}$$

S

odds $\frac{123{,}200}{376{,}740}$

F $\frac{253{,}540}{376{,}740}$

123,200 : 253,540

49% - 51%

$P_S = \frac{220\cdot 560}{376740} = \left(\frac{123200}{376{,}740}\right)$

$P_F = \left(\frac{253540}{376{,}740}\right)$

Ex 4 p 854

50

17 " 33 "

1 – none "

$\frac{{}_{33}C_5}{{}_{50}C_5}$ $\left(\frac{33\cdot 32\cdot 31\cdot 30\cdot 29}{5\,4\,3\,2\,1}\right)$ $\left(\frac{50\,49\,48\,47\,46}{5\,4\,3\,2\,1}\right)$

1 – 11%

89%

Choose 5: at least 1 "

1 "
2 "
3 "
4 "
5 "

${}_{17}C_3$
${}_{17}C_4$ / ${}_{50}C_5$
${}_{17}C_5$ / ${}_{50}C_5$

$= \frac{237,336}{2,118,760}$

$= 11\%$

$P_{win} = \frac{1}{200}$

$P_{lose} \quad 1 - \frac{1}{200} = \frac{199}{200}$

WB 13.3

odds $3:17$

20

$P_W \frac{3}{20}$

$P_L = \frac{17}{20}$

20

10 rap = R

18 rock = K

8 country C

4 pop P

40 T

P = 2 country

$$\frac{{}^{8}C_{2}}{{}^{40}C_{2}} \quad \frac{\frac{8.7}{2.1}}{\frac{40.39}{2.1}}$$

$$= \frac{56}{1560} = \frac{1}{185}$$

11 B (1)

13 X (2)

3 G

27 T

$P_y = \frac{858}{2925} = \frac{22}{75}$

$P_n = \frac{53}{75}$ 22.53

Blue Br.

$P = \frac{{}^{11}C_1 \cdot {}^{13}C_2}{{}^{27}C_3}$ Total

$= \frac{\frac{11}{1} \cdot \frac{13 \cdot 12}{2 \cdot 1}}{\frac{27 \cdot 26 \cdot 25}{3 \cdot 2 \cdot 1}} = \frac{\frac{1716}{2}}{\frac{17550}{6}} = \frac{858}{2925}$