Learning Goal: Odds

Odds: A way to express a level of confidence about an outcome by the **ratio** of the probability that the event will occur to the probability that it will not occur. Odds is **always** presented in a form of a fraction or a ratio.

Odds in favour of A

$$P(A) : P(A') = \frac{P(A)}{P(A')} = \frac{n(A)}{n(A')}$$

Odds against A (reciprocal)

$$\frac{n(A')}{n(A)}$$

eg $\frac{4}{1}$ ~~$= 4$~~ OR 4:1 OR 4 to 1

Relationships between Odds and Probability

If $h = outcomes = n(A)$

$k = complement\ of\ h = n(A')$

Probability:	Odds in Favour:
$P(A) = \frac{h}{h+k}$	$odds = \frac{h}{k}$

Example#1: Given total of 10 baskets: 3 are red 5 are black and 2 are white:

a) What is the odds in favour of red basket?

$P(red) = \frac{3}{10}$

$odds = \frac{3}{10-3} = \frac{3}{7}$

b) What is the odds against white basket?

$P(white) = \frac{2}{10}$

$P(white') = \frac{8}{10}$

$odds = \frac{2}{8}$

$odds\ against = \frac{8}{2} = \frac{4}{1}$

$odds\ against = \frac{8}{2} = \frac{4}{1}$

Example#2: Given the Odds in favour of passing the last unit test is 8:1, What is the probability of passing the last unit test?

$$P(passing) = \frac{8}{8+1} = \frac{8}{9}$$

Example#3:

If the chance of snowing in April is estimated at 0.4, what are the odds against having snows next April?

$P(snow) = \frac{4}{10}$ $\quad odds = \frac{4}{6}$

$odds\ against = \frac{6}{4} = \frac{3}{2}$

Example#4:

The odds of Kevin passing data management are 2:7. What is the probability of Kevin passing data management?

A) Round your answer to 3 decimal places.

$P(passing) = \frac{2}{9} \div 0.222$

B) Provide your answer in percent to 1 decimal place.

22.2%

betting = payout ratio (odds against) 3:5

for every $5 you bet, you will get $3 profit if you win.

$\frac{profit}{bet} \frac{3}{5} = \frac{x}{15}$ $\quad x = 9$