

# AI1103-Assignment 1

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Download all python codes from

<https://github.com/cs20btech11007/assignment1/blob/main/assignment1/code/problem.py>  
<https://github.com/cs20btech11007/assignment1/blob/main/assignment1/Figures/problem%20figures.py>

and latex-tikz codes from

<https://github.com/cs20btech11007/assignment1/blob/main/assignment1/main.tex>

and

$$P(i)_h = \frac{3}{4}$$

using binomial distribution and now finding probability distribution of number of tails in the events.

$$P(i = k)_t = \binom{n}{k} \left(\frac{1}{4}\right)^n \left(1 - \frac{3}{4}\right)^{n-k}$$

in the above event  $n = 2$

$P(i = 0)_t$  denotes the " 0 " number of times the coins showed tail in 2 tosses.

$$P(i = 0)_t = \binom{2}{0} \left(\frac{1}{4}\right)^0 \left(1 - \frac{3}{4}\right)^{2-0} = \frac{3 * 3}{4 * 4} = \frac{9}{16}$$

$P(i = 1)_t$  denotes the " 1 " number of times the coins showed tail in 2 tosses.

$$p(i = 1)_t = \binom{2}{1} \left(\frac{1}{4}\right)^1 \left(1 - \frac{3}{4}\right)^{2-1} = (2) * \frac{1 * 3}{4 * 4} = \frac{6}{16}$$

$P(i = 2)_t$  denotes the " 2 " number of times the coins showed tail in 2 tosses.

$$p(i = 2)_t = \binom{2}{2} \left(\frac{1}{4}\right)^2 \left(1 - \frac{3}{4}\right)^{2-2} = \frac{1 * 1}{4 * 4} = \frac{1}{16}$$

1.12

A coin is biased so that the head is 3 times as likely to occur as tail. If the coin is tossed twice, find the probability distribution of number of tails.

*sol.*

In the question given that, coin is biased and head is 3 times as likely to occur as tail.

the coin has tossed twice let  $i$  be random variable  $i \in \{0, 1, 2\}$  denotes outcomes in a experiment showing number of tails .

$P(i)_h$  denotes the out come is head.

$P(i)_t$  denotes the out come is tail .

Given that,

$$P(i)_h = 3P(i)_t$$

and we know that,

$$P(i)_h + P(i)_t = 1 \quad (0.0.1)$$

substitute in eqn (1)

$$P(i)_h = 3P(i)_t$$

$$P(i)_t + 3P(i)_t = 1$$

$$4P(i)_t = 1$$

$$P(i)_t = \frac{1}{4}$$