

Assignment 7

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Download all python codes from

<https://github.com/tanmaygoyal258/AI1103---Probability/tree/main/Assignment7/code.py>

and latex-tikz codes from

<https://github.com/tanmaygoyal258/AI1103---Probability/blob/main/Assignment7/main.tex>

1 PROBLEM

If three coins are tossed simultaneously, the probability of getting atleast one head is:

- 1) $\frac{1}{8}$
- 2) $\frac{3}{8}$
- 3) $\frac{1}{2}$
- 4) $\frac{7}{8}$

2 SOLUTION

Let X represent the number of heads obtained in a trial involving 3 tosses.

Then, X is a binomial random variable defined by:
 $X \sim B(n, p)$ where $n = 3$ and $p = \frac{1}{2}$ and:

$$\Pr(X = k) = {}^nC_k p^k (1 - p)^{n-k} \quad (2.0.1)$$

To find:

$$\Pr(X \geq 1) \quad (2.0.2)$$

$$= 1 - \Pr(X < 1) \quad (2.0.3)$$

$$= 1 - \Pr(X = 0) \quad (2.0.4)$$

$$= 1 - {}^3C_0 p^0 (1 - p)^3 \quad (2.0.5)$$

$$= 1 - (1 - p)^3 \quad (2.0.6)$$

$$= 1 - \left(1 - \frac{1}{2}\right)^3 \quad (2.0.7)$$

$$= \frac{7}{8} \quad (2.0.8)$$