Problem Statement

- X_t = Reward at round t

- **Objective: Maximize Expected total no. of heads:**

$$\mathbb{E}[X_1 + X_2 + \cdots + X_{100}]$$

- **Maximum attainable reward in expectation = Rs** 100×9

- **Maximizing expected total reward is equivalent to Minimizing the regret**

$$100 \times 9 - \mathbb{E}[X_1 + X_2 + \cdots + X_{100}]$$

Simplifying Regret

Mean reward upon head	Loss w.r.t. best coin (Red in this case)	No. of times tossed
$10 \times p_1 = \text{Rs } 9$	Rs 0	$N_1 = 5$
$10 \times p_2 = \text{Rs } 1$	Rs 8	$N_2 = 3$
$10 \times p_3 = \text{Rs } 3$	Rs 6	$N_3 = 5$

Total expected reward $= 9 \times N_1 + 1 \times N_2 + 3 \times N_3$

Total expected regret $= 0 \times N_1 + 8 \times N_2 + 6 \times N_3$

Regret is suffered only for pulling the sub-optimal arms

(blue and magenta in this case)