8. For the i^{th} person, we introduce a random variable X_i that takes the value 1 if the person selects his/her own hat and takes the value 0 otherwise. Since:

$P(X_i = 1) = 1/n$ and $P(X_i = 0) = 1 - 1/n$,

mean of X_i is,

$$E[X_i] = 1 \cdot 1/n + 0 \cdot (1 - 1/n) = 1/n$$

and

$$X = X_1 + X_2 + X_3 + \dots + X_n$$

$$\Rightarrow E[X] = E[X_1] + E[X_2] + \dots + E[X_n]$$

$$= n \times 1/n$$

$$E[X] = 1$$