

Assignment 1

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- 1) Probability that A speaks truth is $\frac{4}{5}$. A coin is tossed. A reports that a head appears. The probability that actually there was head is

- a) $\frac{4}{5}$
- b) $\frac{1}{2}$
- c) $\frac{1}{5}$
- d) $\frac{2}{5}$

Solution: Consider the random variables X, Y as described in the table 1.

RV	Values	Description
X	$\{0, 1\}$	0: A speaks truth, 1: A lies
Y	$\{0, 1\}$	0: Heads, 1: Tails

TABLE 1: Random variables X, Y

The given information about probabilities is listed in table 1.

Event	Probability
$\Pr(X = 0)$	$\frac{4}{5}$
$\Pr(Y = 0)$	$\frac{1}{2}$
$\Pr(Y = 0 X = 0)$	$\frac{1}{2}$

TABLE 1: Probabilities

The required probability is given by

$$\Pr(X = 0 | Y = 0) = \frac{\Pr(X = 0) \Pr(Y = 0 | X = 0)}{\Pr(Y = 0)} \quad (0.0.1)$$

$$= \frac{\frac{4}{5} \times \frac{1}{2}}{\frac{1}{2}} \quad (0.0.2)$$

$$= \frac{4}{5} \quad (0.0.3)$$