

# 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  $A, X$  as described in the table 1.

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

TABLE 1: Random variables  $A, X$

The given information about probabilities is listed in table 1.

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

TABLE 1: Probabilities

The required probability is given by

$$\Pr(A = 1 | X = 1) = \frac{\Pr(A = 1) \Pr(X = 1 | A = 1)}{\Pr(X = 1)} \quad (0.0.1)$$

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

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