

Roll two 3-sided dice

	die 1 (X)	die 2 (Y)	
$\frac{1}{3}$	1	1	$\frac{1}{9}$
$\frac{1}{3}$	1	2	$\frac{1}{9}$
$\frac{1}{3}$	1	3	$\frac{1}{9}$
$\frac{1}{3}$	2	1	
$\frac{1}{3}$	2	2	
$\frac{1}{3}$	2	3	
$\frac{1}{3}$	3	1	
$\frac{1}{3}$	3	2	
$\frac{1}{3}$	3	3	

$\frac{1}{9} = \frac{1}{3} \cdot \frac{1}{3}$

$$P(X=1, Y=1) = \frac{1}{9}$$

$$1 \quad 2 = \frac{1}{9}$$

- joint
- conditional
- independence

of given

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$$P(Y=1 \mid X=1) = \frac{1}{3}$$

$$P(X, Y) = P(X) \cdot P(Y)$$

$$P(Y \mid X) = P(Y)$$

$$C: \{H, T\} \quad \boxed{1} \quad P(H, 1) = \frac{1}{6}$$

$$D: \{1, 2, 3\} \quad \frac{1}{2} \quad P(H, 2) = \frac{1}{6}$$

$$P(H, 3) = \frac{1}{6}$$

$$\text{Tails} \rightarrow .6 \quad .2 \quad .2$$

$$\text{Heads} \rightarrow \frac{1}{3} \quad \frac{1}{3} \quad \frac{1}{3}$$

$$P(T, 1) = .3$$

$$P(T, 2) = .1$$

$$P(T, 3) = .1$$

$$\boxed{2} \quad P(D=1 | C=T) = \frac{3}{5} = .6$$

$$\boxed{3} \quad P(D=1) = \frac{7}{15}$$