

Assignment -1 in \LaTeX

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Problem 10.13.3.21:

Two dice are thrown together. Find the probability that the product of the numbers on the top of the dice is

- 1) 6
- 2) 12
- 3) 7

Solution:

x = Outcome of the first dice

y = Outcome of the second dice

$$\Pr(XY \leq N) = \sum_{k=1}^m \Pr(X = k) F_Y(N/k) \quad (1)$$

$$= \sum_{k=1}^m \frac{1}{6} F_Y(N/k) \quad (2)$$

where $\Pr(X)$ denotes pmf of random variable x

$F_Y(y)$ denotes cdf of random variable y

m is the largest integer such that $m \leq N$

Since random variables x, y are independent

$$\Pr(x, y) = \Pr(x) \times \Pr(y) = \frac{1}{6} \times \frac{1}{6} = \frac{1}{36} \quad (3)$$

1) Product = 6

$xy = 6$ for $(x, y) = \{(1, 6), (2, 3), (3, 2), (6, 1)\}$

No. of events for product to be 6 = 4

$$\Pr(xy = 6) = 4 \times \frac{1}{36} = \frac{1}{9} \quad (4)$$

2) Product = 12

$xy = 12$ for $(x, y) = \{(2, 6), (3, 4), (4, 3), (6, 2)\}$

No. of events for product to be 12 = 4

$$\Pr(xy = 12) = 4 \times \frac{1}{36} = \frac{1}{9} \quad (5)$$

3) Product = 7

$xy = 7$ for $(x, y) = \{\}$

$$\Pr(xy = 7) = 0 \quad (6)$$