Suppose one fair die is rolled. What is the probability its value is 3 or 4 but not 6, given that it is 4 or 5 but not 1 ?

(a) 1/2

(b) 1/3

(c) 1/4

(d) 1/5

(e) 1/6

(f) 1/8

(g) 2/3

(h) 3/4

(i) 1

(j) 0

(k) 5/8

(l) 3/8

(m) None of these

$|S| = 6 \quad S = \{1,2,3,4,5,6\}$

$E = (3 \cup 4) \cap 6^c = \{3,4\} \quad (\{3,4\} \setminus \{6\} = \{3,4\})$

$F = \{4,5\}$

$P(E|F) = \frac{P(EF)}{P(F)} = \frac{\frac{1}{6}}{\frac{2}{6}} = \frac{1}{2}$

Suppose two fair dice are rolled. What is the probability the sum of their values is 2, given the sum is not 4.

(a) 1/33

(b) 1/36

(c) 2/33

(d) 1/11

(e) 1/6

(f) 1/18

(g) 1/9

(h) 3/35

(i) 1/35

(j) 1/3

(k) 1/34

(l) 1/2

(m) None of these

$|S| = 6^2 = 36$

$E = \{(1,1)\}$

$F = 4^c = \{(1,3),(2,2),(3,1)\}^c \quad |F| = 33$

$$P(E|F) = \frac{P(EF)}{P(F)} = \frac{\frac{1}{36}}{\frac{33}{36}} = \frac{1}{33}$$

Suppose two fair dice are rolled. What is the probability the product of their values is not smaller than their sum ?

(a) 25/36

(b) 11/36

(c) 2/3

(d) 13/18

(e) 23/36

(f) 3/4

(g) 1/3

(h) 1/2

(i) 5/6

(j) 1/6

(k) 7/9

(l) 8/9

(m) None of these

$|S| = 36$

product $\geq$ sum

↳ only when a 1 is rolled

$E^c = \{(1,1), (1,2), (1,3), \ldots, (3,1), (2,1), \}$

$|E^c| = 11 \longrightarrow E = 25$

$P(E) = \frac{25}{|S|} = \frac{25}{36}$