Challenge Problem 4

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1 Problem

Let F, G and H be pair wise independent events such that $\Pr(F) = \Pr(G) = \Pr(H) = \frac{1}{3}$ and $\Pr(F \cap G \cap H) = \frac{1}{4}$ Then the probability that at least one event among F, G and H occurs is

1) $\frac{11}{12}$ 2) $\frac{7}{12}$ 3) $\frac{5}{12}$ 4) $\frac{3}{4}$

2 Solution

We know that, if F, G, H are pair wise independent events,

$$\Pr(FGH) = \Pr(F)\Pr(G)\Pr(H) \tag{2.0.1}$$

$$= \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} \tag{2.0.2}$$

$$= \frac{1}{27} \tag{2.0.3}$$

$$\neq \frac{1}{4} \qquad \text{(Given in the question)}$$

Therefore, the data provided in the question is **incorrect**.