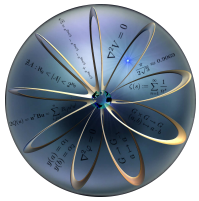

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example of pairwise independent events that are not totally independent

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Consider a fair tetrahedral die whose sides are painted red, green, blue, and white. Roll the die. Let X_r, X_g, X_b be the events that die falls on a side that have red, green, and blue color components, respectively. Then

$$P(X_r) = P(X_g) = P(X_b) = \frac{1}{2},$$
$$P(X_r \cap X_g) = P(X_w) = \frac{1}{4} = P(X_r)P(X_g),$$

but

$$P(X_r \cap X_g \cap X_b) = \frac{1}{4} \neq \frac{1}{8} = P(X_r)P(X_g)P(X_b).$$