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Problem 1. Construct 3 events that are pairwise independent but not mutually independent.

Problem 2. $G_{n,p}$ is the random graph on n vertices where edges are included independently with probability p. Show that if $pn \to 0$ as $n \to \infty$, then

$$\mathbf{Pr}[G_{n,p} \text{ has a triangle}] \to 0.$$

Problem 3. Show that if $p = \frac{\log n + t_n}{n}$ where $t_n \to \infty$ as $n \to \infty$, then

$$\mathbf{Pr}[G_{n,p} \text{ has an isolated vertex}] \to 0.$$

Hint: Recall the inequality $1 - x \leq e^{-x}$ from WS3.