# Section 01: Foundations: In-class examples

**1. Joint events vs. marginal events:**

Assume $\Pr\{X > 1\} = 0.80$, $\Pr\{Y > 1\} = 0.9$, $\Pr\{X > 1, Y > 1\} = 0.77$.

Find $\Pr\{X \leq 1, Y > 1\}$

$$\Pr\{Y > 1\} = \Pr\{Y > 1, X \leq 1\} + \Pr\{Y > 1, X > 1\}$$

$$\Leftrightarrow$$

$$\Pr\{X \leq 1, Y > 1\} = \Pr\{Y > 1\} - \Pr\{Y > 1, X > 1\}$$

$$= 0.9 - 0.77$$

$$= 0.13$$

**2. Mixture distribution and linear combination of random variables:**