

STA 110
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Quiz 2 - Solution

Sherwood Story. Robin Hood hits the target with the probability 0.8 while the Sheriff of Nottingham hits the target with the probability (ver 1: 0.7; ver 2: 0.6). They shoot 2 arrows each and all shots are independent of each other.

(a) What event is more likely:

A: Sheriff hits the target at least (most: ver 2) once ; or **B:** Robin hits the target at most (least: ver 2) once. Explain.

$$P(A) = P(S \text{ hits the target at least once}) = 1 - P(S \text{ miss both}) = 1 - 0.3^2 = 0.91.$$

$$P(B) = 1 - P(\text{Robin hits the target at most once}) = P(R_1^c R_2^c \cup R_1 R_2^c \cup R_1^c R_2) = 0.2^2 + 2 * 0.2 * 0.8 = 0.36.$$

$$P(B) < P(A).$$

(b) They shoot in the following order: **S R S R.** (**R S R S:** ver 2). What is the probability that the Sheriff scores before Robin?

$$P(\text{Sheriff before Robin}) = P(S \cup S^c R^c S) = 0.7 + 0.3 \cdot 0.2 \cdot 0.7 = 0.742.$$