**Independent Events**

Say events $A, B$ are independent if $P(A \cap B) = P(A)P(B)$. Otherwise, say $A, B$ are dependent.

Roll two dice

Define $A$ as the event "red die shows value $\geq 3$" and $B$ as the event "green die shows value $\geq 5$".

"Red" outcomes are in $A$

- $P(A) = \frac{24}{36} = \frac{2}{3}$
- $P(B) = \frac{6}{36} = \frac{1}{6}$

"Green" outcomes are in $B$

- $P(A \cap B) = \frac{1}{9}$
- $P(A \cap B) = \frac{1}{9} = \frac{1}{3} \cdot \frac{1}{2} = P(A)P(B)$

So events $A$ and $B$ are independent.

Event $C$ as the event maximum of the two dice is $5$ or greater.

Event $A$ is that red die $\geq 3$.

- $P(A) = \frac{24}{36} = \frac{2}{3}$
- $P(C) = \frac{20}{36} = \frac{5}{9}$

- $P(A \cap C) = \frac{16}{36} = \frac{4}{9}$

So $P(A \cap C) \neq P(A)P(C)$

So $A, C$ are not independent.

Instead $A, C$ dependent events.