

Lab 4

1) $X_1 \in \{0, 1\}$, $X_2 \in \{0, 1\}$
 $X_1 + X_2 = Z \in \{0, 1, 2\}$

• $P(X_1 = 1) = 0.5$

$P(X_2 = 1) = 0.5$

$P(X_1 = 1 \& X_2 = 1) = P(X_1 = 1) \times P(X_2 = 1) = 0.25$
independent

• $P(Z = 0) = \frac{1}{3}$ $P(X_1 = 1) = \frac{1}{2}$

$P(X_1 = 1 \cap Z = 0) = 0$

but $P(X_1 = 1) \times P(Z = 0) = \frac{1}{6}$

hence dependent

• $P(X_1 = 1, X_2 = 1 \mid Z = 1) = \frac{P(X_1 = 1 \cap X_2 = 1 \cap Z = 1)}{P(Z = 1)}$
since when $X_1 = X_2 = 1$ $Z = 1$
 $\therefore \textcircled{1} = 0$

now $P(X_1 = 1 \mid Z = 1) = \frac{P(X_1 = 1 \cap Z = 1)}{P(Z = 1)}$

$\neq 0$

similarly for $P(X_2 = 1 \mid Z = 1) \neq 0$

\Rightarrow hence dependent