6. We have that:
\[
P(X \cup Y) \leq P(X) + P(Y) \leq P(X \cup Y) \\ P(X \cap Y) \leq P(X) + P(Y) - P(X \cup Y)
\]
and
\[
f_X(\alpha) \leq f_X(\xi) + f_X(\zeta) \leq f_X(\alpha)
\]
where we have that:
\[
f_X(\alpha) = f_Y(\alpha)(\alpha) = 0 \quad \text{or} \quad \theta
\]

12. Let \(X_1, X_2, \ldots, X_n\) be the number of males standing at the center of the room after time 1, 2, \ldots, \(n\) minutes have been called. The students whose heights have been calculated are not standing. Let \(A_1, A_2, \ldots, A_n\) be the males whose heights have been calculated. Let

\[
E(X_i) = \frac{1}{n} \sum_{i=1}^{n} X_i
\]

and

\[
E(Y_j) = \frac{1}{n} \sum_{j=1}^{n} Y_j
\]

we have that:

\[
E(X_1 \cdot X_2 \cdots X_n) = \frac{1}{n} \sum_{i=1}^{n} X_i
\]

Therefore:

\[
E(X_1 \cdot X_2 \cdots X_n) = 0
\]

4.12. Let \(X_1, X_2, \ldots, X_n\) be the number of males standing at the center of the room after time 1, 2, \ldots, \(n\) minutes have been called. The students whose heights have been calculated are not standing. Let \(A_1, A_2, \ldots, A_n\) be the males whose heights have been calculated. Let

\[
E(X_i) = \frac{1}{n} \sum_{i=1}^{n} X_i
\]

and

\[
E(Y_j) = \frac{1}{n} \sum_{j=1}^{n} Y_j
\]

we have that:

\[
E(X_1 \cdot X_2 \cdots X_n) = \frac{1}{n} \sum_{i=1}^{n} X_i
\]

Therefore:

\[
E(X_1 \cdot X_2 \cdots X_n) = 0
\]