External Problem:
Let \( x \) and \( y \) be two real numbers selected at random over the interval \([0, 1]\) and define the events \( A, B \) and \( C \) as follows:

\[
A = \{ x > 0.5 \} \quad B = \{ y > 0.5 \} \quad \text{and} \quad C = \{ x > y \}
\]

1. Are \( A \) and \( B \) independent?
2. Are \( A \) and \( C \) independent?

**Hint:** Use the \( x-y \) Cartesian plane to model the problem.

**Solution:**

Because the events \( A, B \) and \( C \) are continuous, their probability is the area they cover, respectively.

1. \[
P[A|B] = \frac{P[A \cap B]}{P[B]} = \frac{1/4}{1/2} = \frac{1}{2} = P[A]
\]
   \[\implies A \text{ and } B \text{ are independent.}\]

2. \[
P[A|C] = \frac{P[A \cap C]}{P[C]} = \frac{(1/2)(1/2)}{1/2} = \frac{1}{2} \neq P[A]
\]
   \[\implies A \text{ and } C \text{ are NOT independent.}\]