Homework 3: Problem 2

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Problem 2:
We wish to determine if the variables X and Y are independent.

We know that two variables are independent if they satisfy

$$P(A\&B) = P(A) \cdot P(B)$$

From the information given, we can find $P(X)$ from the events where $X = 1$. This is equal to

$$P(X) = 0.32 + 0.08 = 0.40$$

Likewise, we can find $P(Y)$ as

$$P(Y) = 0.32 + 0.48 = 0.80$$

We can then calculate $P(X) \cdot P(Y)$ as

$$P(X) \cdot P(Y) = 0.80 \cdot 0.40 = 0.32$$

The given value of $P(X\&Y)$ (where both variables are 1) is 0.32, so since $P(X\&Y) = P(X) \cdot P(Y)$ we have determined that X and Y are independent.