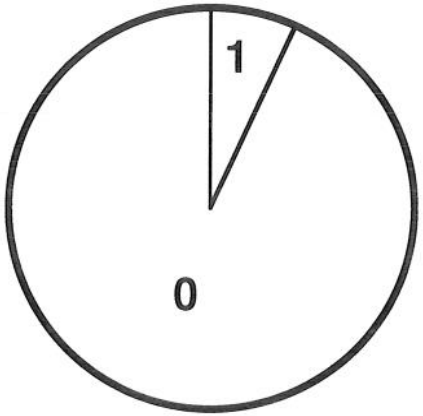
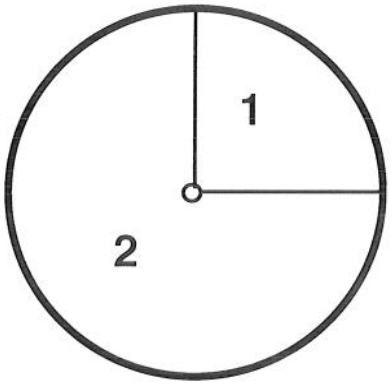
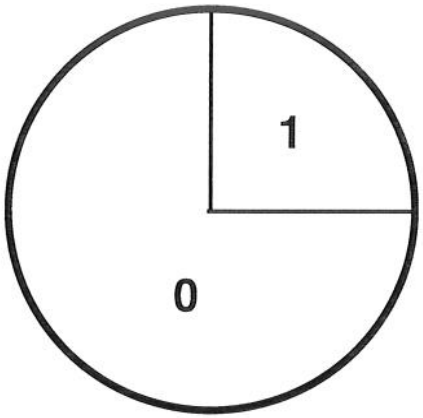
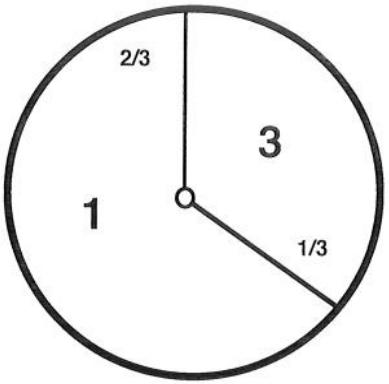
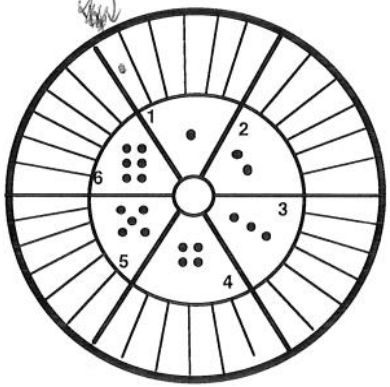


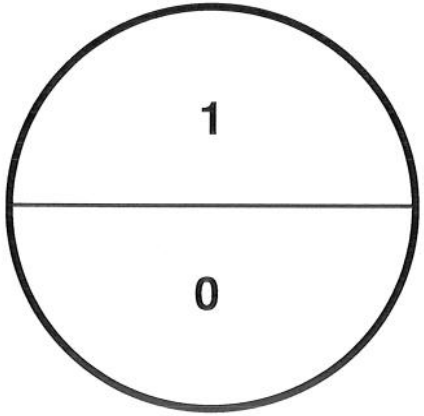


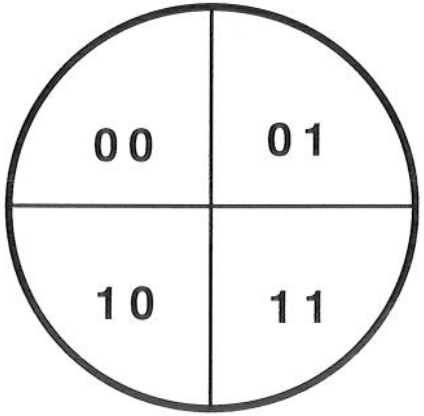




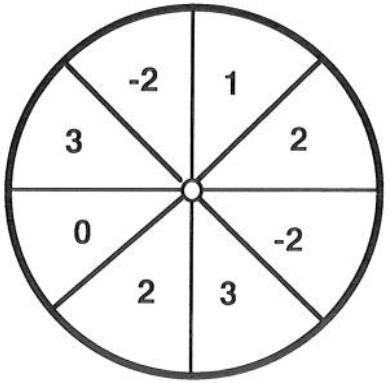
1/36







$$P(\text{green}=1 \mid \text{red}=1) = \frac{P(\text{green}=1 \,\&\, \text{red}=1)}{P(\text{red}=1)} = 1/6$$

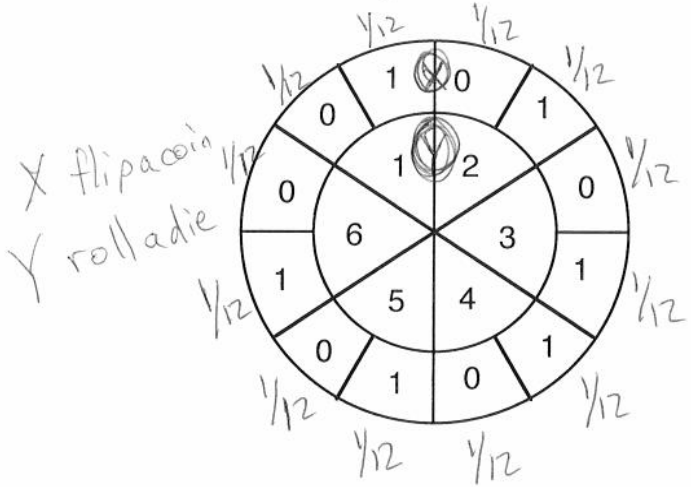


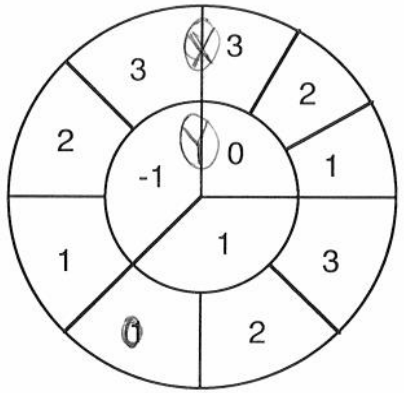
X is independent of Y if $P(X = a|Y = b) = P(X = a)$

or $P(X = a \text{ and } Y = b) = P(X = a)P(Y = b)$

or knowing the value of Y does not change the probabilities of X

If X is independent of Y, then Y is independent of X.



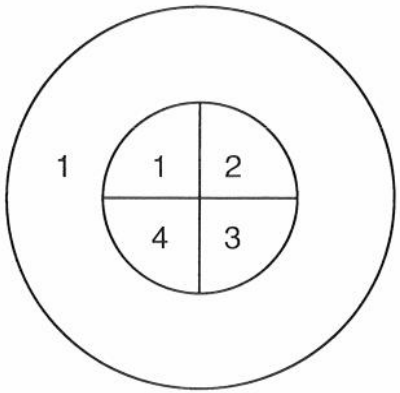


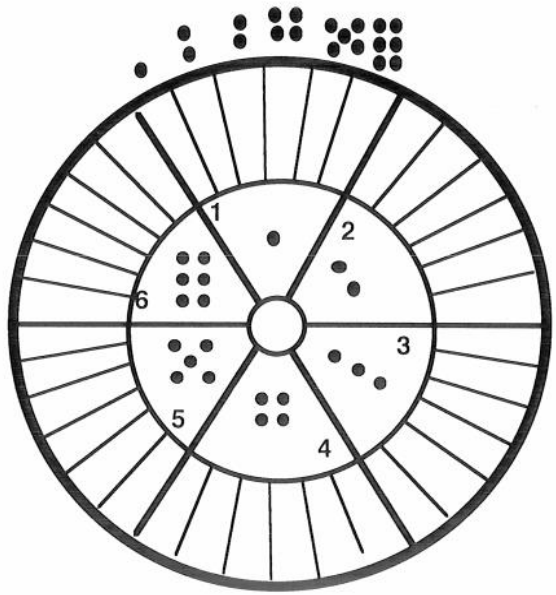
$P(X=1 \ \& \ Y=1)$

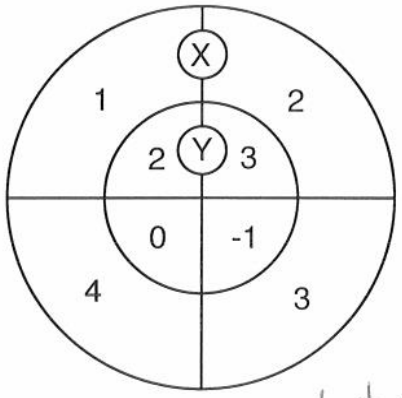
$= 0$

$P(X=1)P(Y=1) =$

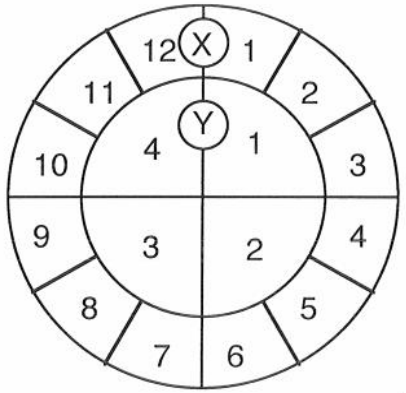
$\frac{2}{4} \cdot \frac{3}{4} = \frac{1}{12}$



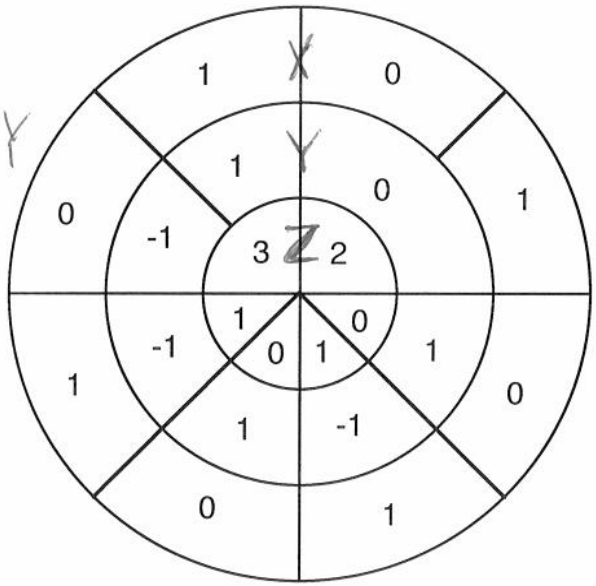




X is dependent on Y
and Y is dependent on X



X is not dependent on Y
Y is dependent on X



Z is dependent on X & Y
Y is dependent on X & Z

X is not dependent on Y & Z

Y is not dependent on X
X is not dependent on Y
X is not dependent on Z
Z is not dependent on X
Y is not dependent on Z
Z is not dependent on Y

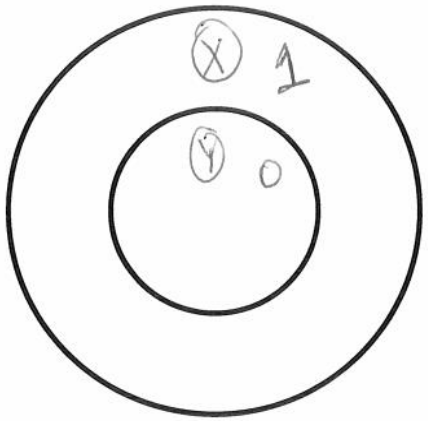
X is dependent on Y if X is a function of Y

that is, knowing the value of Y determines the value of X

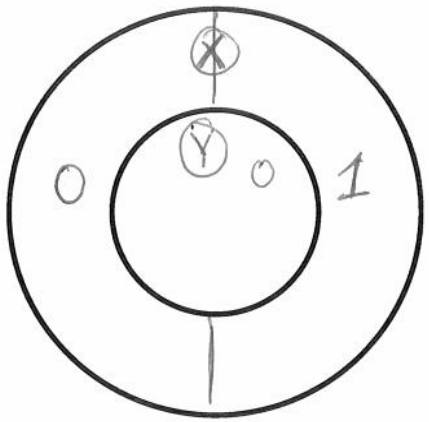
"X is dependent on Y" and "X is independent of Y" are not opposite statements of each other, rather they are on opposite sides of a spectrum of possibilities.

"X is not dependent on Y" does not mean "X is independent of Y"

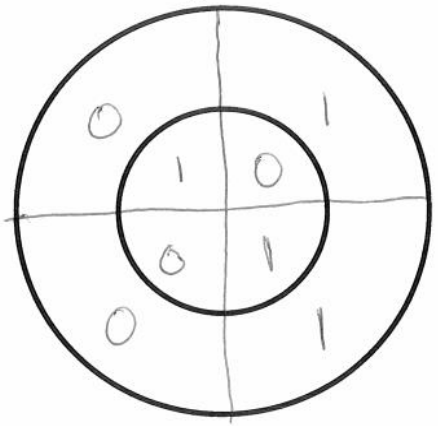
X is independent of Y
X is dependent on Y
Y is dependent on X



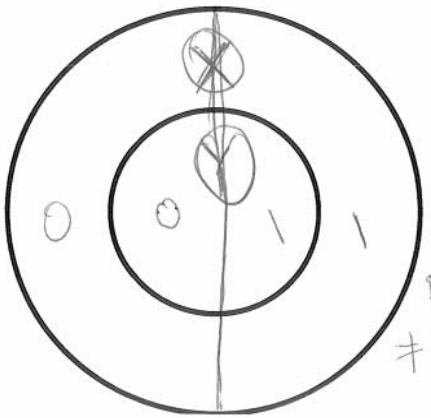
X is independent of Y
X is not dependent on Y
Y is dependent on X



X is independent of Y
X is not dependent on Y
Y is not dependent on X

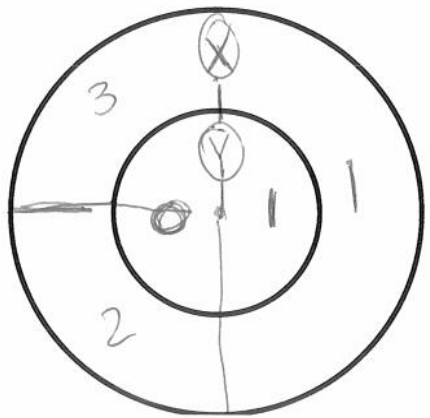


X is not independent of Y
X is dependent on Y
Y is dependent on X



$P(X=0 \& Y=1) \neq P(X=0)P(Y=1)$

X is not independent of Y
X is not dependent on Y
Y is dependent on X



X is not independent of Y
X is not dependent on Y
Y is not dependent on X