Chapter 2, Problem 2.7

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2.7 Swing voters. A 2012 Pew Research survey asked 2,373 randomly sampled registered voters their political affiliation (Republican, Democrat, or Independent) and whether or not they identify as swing voters. 35% of respondents identified as Independent, 23% identified as swing voters, and 11% identified as both.[58]

(a) Are being Independent and being a swing voter disjoint, i.e. mutually exclusive?

(b) Draw a Venn diagram summarizing the variables and their associated probabilities.

(c) What percent of voters are Independent but not swing voters?

(d) What percent of voters are Independent or swing voters?

(e) What percent of voters are neither Independent nor swing voters?

(f) Is the event that someone is a swing voter independent of the event that someone is a political Independent?

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a) Are being Independent and being a swing voter disjoint, i.e. mutually exclusive?

No they are not disjoint since 11% of voters identify as both independent and swing voters.

b) Draw a Venn diagram summarizing the variables and their associated probabilities.

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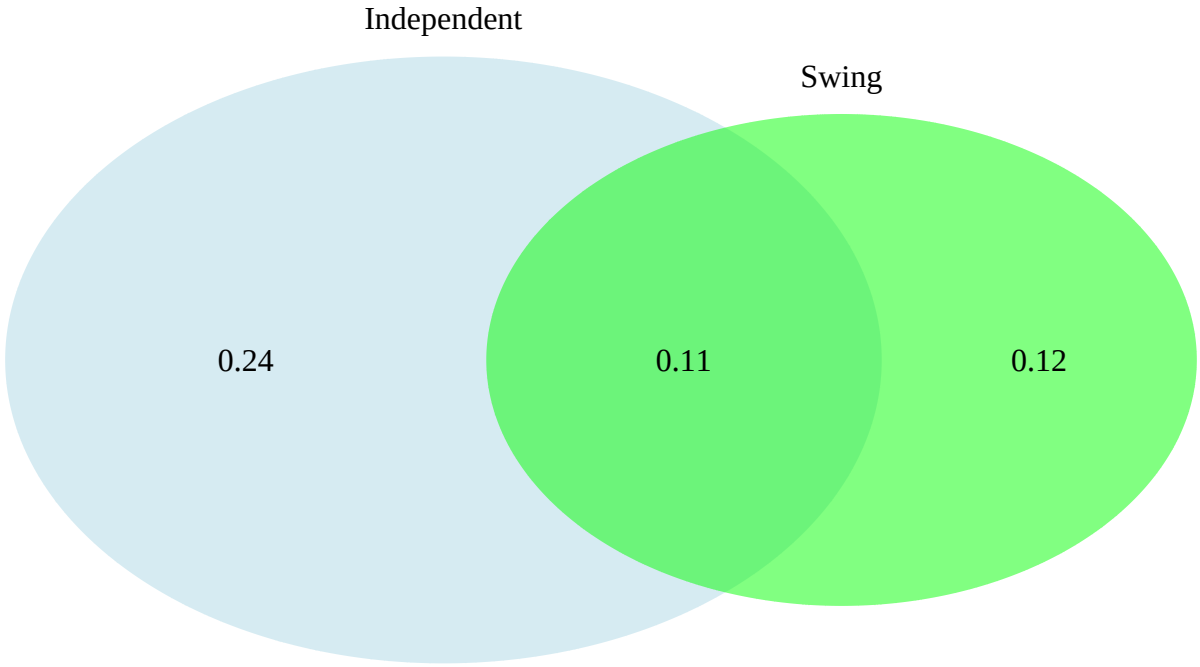


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c) What percent of voters are Independent but not swing voters?

We are told that 35% of voters are independent, and 11% of voters identify as both independent AND swing voters. Therefore, the percentage of voters that are independent but not swing voters is:

$.35 - .11 = .24 = 24\%$

d) What percent of voters are Independent or swing voters?

We are told that 35% of voters are Independent, 23% are swing voters, and 11% identify as both Independent AND swing. Therefore, the percentage of voters that are Independent OR swing voters is:

$.35 + .23 - .11 = .47 = 47\%$

e) What percent of voters are neither Independent nor swing voters?

The percentage of voters that are neither independent nor swing voters is the **complement** of the percentage of voters that are EITHER independent or swing, which we calculated in our answer to part **d)** above as 47%. Therefore, we can simply subtract .47 from 1 to find our answer:

$1 - .47 = .53 = 53\%$

f) Is the event that someone is a swing voter independent of the event that someone is a political Independent?

No since there is overlap between the two groups. As we're told, 11% of voters identify as both independent and swing.

We can also show this mathematically by testing for equivalence of $P(A) * P(B) = P(A, B)$ where P(A) is the probability of being independent and P(B) is the probability of being a swing voter:

- P(Independent) = .35 = P(A)
- P(Swing) = .23 = P(B)
- P(A) * P(B) = .35 * .23 = 0.0805
- P(A,B) = .11 (given to us in text)

As we can see, $(P(A) * P(B) = .0805)! = (P(A, B) = .11)$ so these events are NOT independent.