

The last presidential election that was a popular vote landslide was in 1984, in which republican Ronald Reagan defeated democrat Walter Mondale by a 59% to 41% margin. Suppose we have 100 voters from that election, who are representative of how the overall elector ate voted, categorized by region of country and candidate voted for. The results are tabulated below.

| Candidate/Region | East (E) | Midwest (M) | South (S) | West (W) | Total |
|------------------|----------|-------------|-----------|----------|-------|
| Mondale (D) | 12 | 12 | 6 | 7 | 37 |
| Reagan (R) | 14 | 18 | 17 | 10 | 59 |
| Total | 26 | 30 | 23 | 17 | 100 |

2x5
Table

One voter from the 100 is selected at random and his/her region and candidate voted for are noted.

Which of the following is *false*?

a. The events 'R' and 'E' are independent.

b. $P(R|E) = .538$

c. $P(R) = .59$

d. $P(R|E) = .14$

Suppose two fair dice are tossed. What is the probability the sum of the spots facing up is 9?
(Note: the sample space is all ordered samples of size 2 with replacement from the numbers 1-6)

a. 1/9

b. 1/18

c. 1/12

d. 5/36

$$P(R|E) = \frac{P(R \cap E)}{P(E)}$$

$$P(R|E) \neq P(R)$$

They are not same

9. Two thousand persons randomly selected are asked their views on animal cloning. The results are tabulated by gender (M: F) and by their view on cloning (in favor (Y), opposed (O), no opinion (N)). Results are below.

| Gender | In Favor (Y) | Opposed (O) | No Opinion (N) | Total |
|------------|--------------|-------------|----------------|-------|
| Male (M) | 395 | 405 | 100 | 900 |
| Female (F) | 300 | 680 | 120 | 1100 |
| Total | 695 | 1085 | 220 | 2000 |

Suppose one person is selected at random from the 2000 surveyed.

(a) Compute $P(F \cap O)$

$$\frac{n(F \cap O)}{n(s)} = \frac{680}{2000}$$

(b) Compute $P(F)$ and $P(O)$.

$$\frac{1085}{2000}$$

(c) Compute $P(F \cup O)$

$$P(F \cup O) = P(F) + P(O) - P(F \cap O)$$

(d) Compute $P(F \cap O)$ and decide if the events F and O are independent

$$\frac{P(F \cap O)}{1085} \neq P(F) = .55$$

Suppose two fair dice are tossed. What is the probability the sum of the spots facing up is 4?
(Note: the sample space is all ordered samples of size 2 with replacement from the numbers 1-6)

a. 4/36

b. 2/36

c. 3/36

d. 5/36

$$\{(1,3), (2,2), (3,1)\}$$

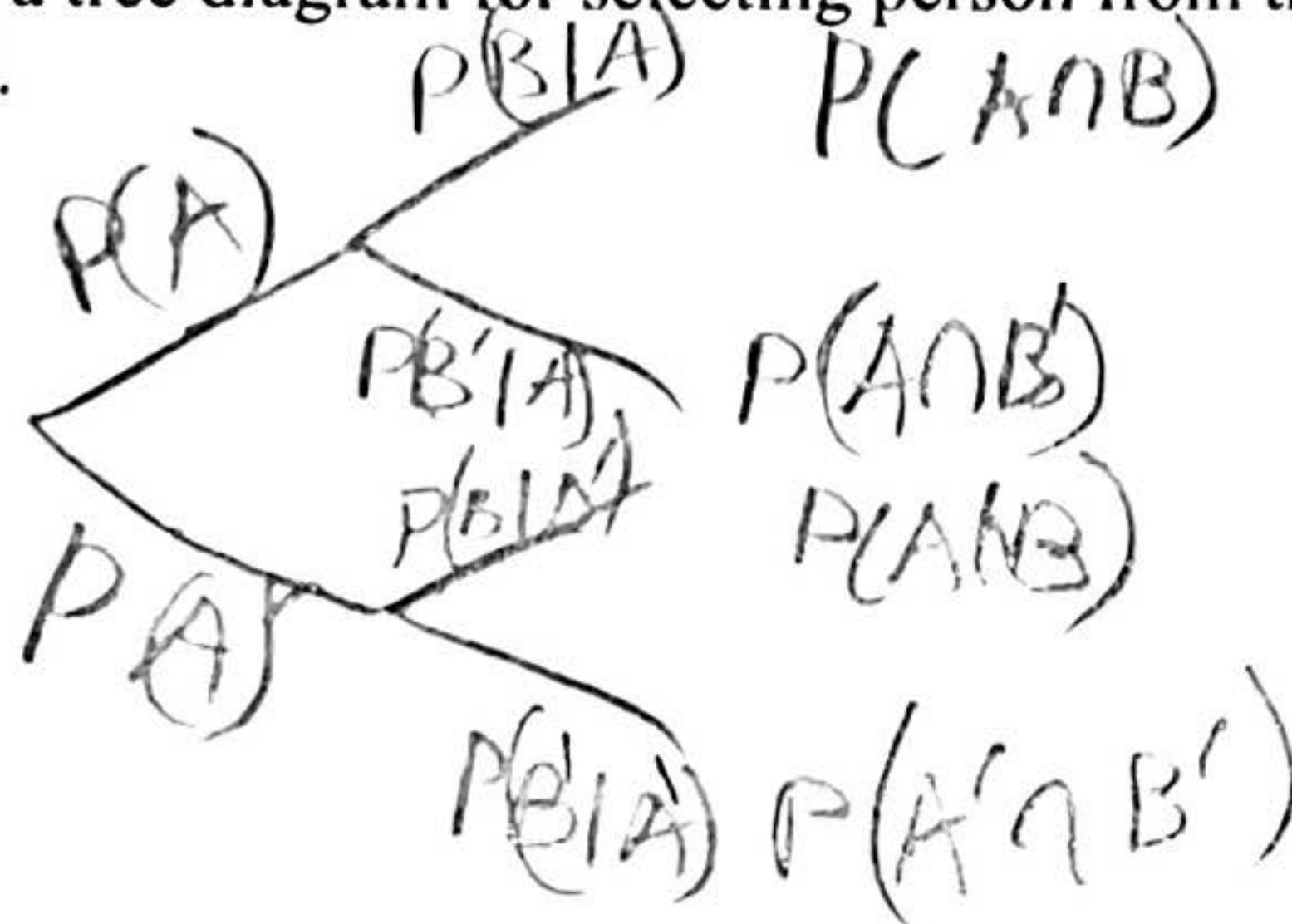
$$\frac{3}{36}$$

I. Testing for HIV: Enzyme immunoassay (EIA) tests are used to screen blood specimens for the presence of antibodies to HIV, the virus that causes AIDS. Antibodies indicate the presence of the virus. The test is quite accurate but not always correct. Here are approximate probabilities of positive and negative EIA outcomes when the blood tested does and does not actually contain antibodies to HIV:

| | Test Result: | |
|--------------------|--------------|--------|
| | + | - |
| Antibodies Present | 0.9985 | 0.0015 |
| Antibodies absent | 0.0060 | 0.9940 |

Suppose that 1% of a large population carries antibodies to HIV in their blood.

- (a.) Draw a tree diagram for selecting person from the population and testing his or her blood.



- (b.) What is the probability that the EIA test is positive for a randomly chosen person from this population?
- (c.) What is the probability that a person has the antibody, given that the EIA test is positive?

Note: This illustrates a fact that is important when considering proposals for widespread testing for HIV, illegal drugs, or agents of biological warfare: if the condition being tested is uncommon in the population, many positives will be false positives.