Suppose we choose a random graduate from this data.

Are the events "income is $40,000 and over" and "attended University B" independent?

Let's check using conditional probability.

EXAMPLE 1: PROBLEM A

What is the probability that a randomly selected graduate earns $40,000 and over?

$P(\$40{,}000 \text{ and over}) =$ 0.25

Check

Explain

EXAMPLE 1: PROBLEM B

What is the probability that a randomly selected graduate earns $40,000 and over *given* they are from University B?

$P(\$40{,}000 \text{ and over} \mid \text{Uni. B}) =$ 1/3

Check

Explain

EXAMPLE 1: PROBLEM C

Are the events "income is $40,000 and over" and "attended University B" independent?

Choose 1 answer:

A Yes

CORRECT (SELECTED)

No

Check

Explain

Example 2: Income and universities (continued)

Here is the same data from the previous example:

Annual income	University A	University B	TOTAL
Under $20,000	36	24	60
$20,000 to 39,999	109	56	165
$40,000 and over	35	40	75
TOTAL	180	120	300

Suppose we choose a random graduate from this data.

Statistics › Probability › Conditional probability
Conditional probability

Conditional probability and independence
Conditional probability with Bayes' Theorem
Practice: Calculating conditional probability
Conditional probability using two-way tables
Conditional probability and independence
Conditional probability tree diagram example
Tree diagrams and conditional probability

Are the events "income under $20,000" and "attended University B" independent?

Let's check using conditional probability.

EXAMPLE 2: PROBLEM A

What is the probability that a randomly selected graduate earns under $20,000?

$P(\text{under } \$20{,}000) =$ 0.2

Check

Explain

EXAMPLE 2: PROBLEM B

What is the probability that a randomly selected graduate earns under $20,000 *given* they are from University B?

$P(\text{under } \$20{,}000 \mid \text{Uni. B}) =$ 0.2

Check

Explain

EXAMPLE 2: PROBLEM C

Are the events "income is under $20,000" and "attended University B" independent?

Choose 1 answer:

CORRECT (SELECTED)

Yes

B No

Check

Explain

What if the probabilities are close?

When we check for independence in real world data sets, it's rare to get perfectly equal probabilities. Just about all real events that don't involve games of chance are dependent to some degree.

In practice, we often assume that events are independent and test that assumption on sample data. If the probabilities are significantly different, then we conclude the events are not independent. We'll learn more about this process in inferential statistics.

Finally, be careful not to make conclusions about cause and effect unless the data came from a well-designed experiment. For a challenge, can you think of some outside variables — apart from the universities — that may be the cause of the income