Warm Up   1/24/23

A researcher surveyed 85 females and 50 males about the type of movie they preferred. Copy and Complete the table.

Gender	Action	Comedy	Drama	Total
Favorite Type of Movie				
Female	35		18	
Male	12	28		
Total			28	

1. What is the conditional probability that a person likes drama given that they are a male?

2. What is the conditional probability that a person is a female given that they like comedies?

22.2/22.3 Checking for Independence

We already know events A and B are independent if and only if
$P(A \cap B) = P(A) \cdot P(B)$

Another way to check independence is if $P(A|B)=P(A)$
(the occurrence of event A is unaffected by the occurrence of event B)

There are two ways to test if events are independent using a table.

1. Events are independent if $P(A) \cdot P(B) = P(A \cap B)$

2. Events are independent if $P(A) = P(A|B)$

Is the event that a flight is on time independent of the event that the flight is domestic?

	Late	On Time	Total
Domestic Flights	12	108	120
International Flights	6	54	60
Total	18	162	180

Let O be the event that the flight is on time and D be the event that the flight is domestic.

First Way: Find $P(O) = \frac{162}{180} = 0.9$, $P(D) = \frac{120}{180} = 0.\overline{6}$ and $P(O \cap D) = \frac{108}{180} = 0.6$

Since $0.9 \times 0.\overline{6} = 0.6$, the events are independent.

Second Way: Find $P(O) = \frac{162}{180} = 0.9$, Find $P(O|D) = \frac{108}{120} = 0.9$

Since $P(O) = P(O|D)$, the events are independent.

The two-way frequency table show data for 120 randomly selected patients who have the same doctor. Determine whether a patient who takes vitamins and a patient who exercises regularly are independent events.

	Takes Vitamins	No Vitamins	Total
Regular Exercise	48	28	76
No regular Exercise	12	32	44
Total	60	60	120

Let V be the event a patient takes vitamins. Let E be the event the patient exercises regularly.

Step 1: Find $P(V)$, $P(E)$ and $P(V \cap E)$. The total number of patients is 120.

There are ____ patients who take vitamins so $P(V) =$

There are ____ patients who exercise regularly so $P(E) =$

There are ____ patients who take vitamins and exercise regularly so $P(V \cap E) =$

Step 2: Compare $P(V \cap E)$ and $P(V) \cdot P(E)$. $P(V) \cdot P(E) =$

Because $P(V \cap E) \square P(V) \cdot P(E)$, the event are/are not independent.