14. A Canadian business school summarized the gender and residency of its incoming class as follows:

	Residency				
Gender	**Canada**	**United States**	**Europe**	**Asia**	**Other**
Male	125	18	17	50	8
Female	103	8	10	92	4

a. Construct a joint probability table.

b. Calculate the marginal probabilities.

Joint Probability Distribution

	A1	A2	A3	A4
B1	P(A1∩B1)	P(A2∩B1)	P(A3∩B1)	P(A4∩B1)
B2	P(A1∩B2)	P(A2∩B2)	P(A3∩B2)	P(A4∩B2)
B3	P(A1∩B3)	P(A2∩B3)	P(A3∩B3)	P(A4∩B3)

	A1	A2	A3	A4	Marginal
B1	P(A1∩B1)	P(A2∩B1)	P(A3∩B1)	P(A4∩B1)	P(B1)
B2	P(A1∩B2)	P(A2∩B2)	P(A3∩B2)	P(A4∩B2)	P(B2)
B3	P(A1∩B3)	P(A2∩B3)	P(A3∩B3)	P(A4∩B3)	P(B3)
Marginal	P(A1)	P(A2)	P(A3)	P(A4)	1

Conditional	A1	A2	A3	A4
B1	P(B1|A1)	P(B1|A2)	P(B1|A3)	P(B1|A4)
B2	P(B2|A1)	P(B2|A2)	P(B2|A3)	P(B2|A4)
B3	P(B3|A1)	P(B3|A2)	P(B3|A3)	P(B3|A4)
Marginal	P(A1)	P(A2)	P(A3)	P(A4)

Region	Book	DVD	Total
East	56	42	98
North	43	42	85
South	62	37	99
West	100	90	190
Total	261	211	472

a. Find the marginal probabilities that a sale originated in each of the four regions and the marginal probability of each type of sale (book or DVD).

b. Find the conditional probabilities of selling a book given that the customer resides in each region.

16. Use the Civilian Labor Force data in the Excel file *Census Education Data* to find the following:

a. P(unemployed and advanced degree)

b. P(unemployed | advanced degree)

c. P(not a high school grad | unemployed)

d. Are the events "unemployed" and "at least a high school graduate" independent?

17. Using the data in the Excel file *Consumer Transport Survey*, develop a cross-tabulation for Gender and Vehicle Driven; then convert this table into probabilities.

a. What is the probability that a respondent is female? **0.58**

b. What is the probability that a respondent drives an SUV? 0.30

c. What is the probability that a respondent is male and drives a minivan? 0.02

d. What is the probability that a female respondent drives either a truck or an SUV? 0.10

e. If it is known that an individual drives a car, what is the probability that the individual is female? 0.72727273

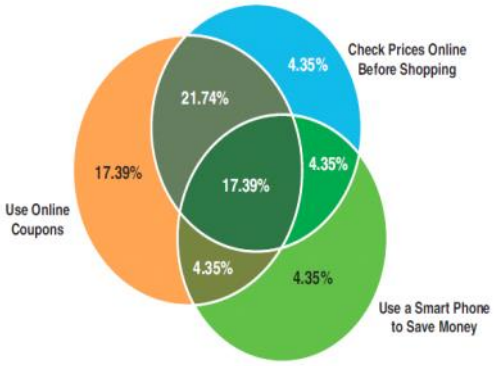
f. If it is known that an individual is male, what is 0.47619

f. If it is known that an individual is male, what is the probability that he drives an SUV? 0.47619

g. Determine whether the random variable "gender" and the event "vehicle driven" are statistically independent. What would this mean for advertisers?

Gender	Female	Male	All
Vehicle Driven			
Car	0.32	0.12	0.44
Mini Van	0.16	0.02	0.18
SUV	0.10	0.20	0.30
Truck	0.00	0.08	0.08
All	0.58	0.42	1.00

```
    ...:                normalize='index')
Out[18]:
Gender              Female      Male
Vehicle Driven
Car               0.727273  0.272727
Mini Van          0.888889  0.111111
SUV               0.333333  0.666667
Truck             0.000000  1.000000
All               0.580000  0.420000
```



0.4783

0.3044

0.6087

0.2608

13. A survey of shopping habits found the percentage of respondents that use technology for shopping as shown in Figure 5.30. For example, 17.39% only use online coupons; 21.74% use online coupons and check prices online before shopping, and so on.

a. What is the probability that a shopper will check prices online before shopping?

b. What is the probability that a shopper will use a smart phone to save money?

c. What is the probability that a shopper will use online coupons?

d. What is the probability that a shopper will not use any of these technologies?

e. What is the probability that a shopper will check prices online and use online coupons but not use a smart phone? 0.2174

f. If a shopper checks prices online, what is the probability that he or she will use a smart phone? 0.2174

g. What is the probability that a shopper will check prices online but not use online coupons or a smart phone? 0.0435