

# Ch5 Final Project - Mass Appeal

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## Step 1

Using the given information about hopkinsville, I will allocate certain ranges of numbers to each category as follows:

Age:

0 -> Age 24 or younger

1-47 -> Age 25-54

48-71 -> Age 55-64

72-99 -> Age 65+

Car Type:

0-30 -> Cars

31-66 -> SUVs

67-99 -> Trucks

Color:

0-20 -> White

21-51 -> Silver/Gray

52-70 -> Black

71-80 -> Red

81-99 -> Other

Now, I will choose 3 random numbers from 0-99 for each customer and determine their simulated age, vehicle type and color.

Sample	Age Group	Type	Color
1	25-54	Car	White
2	65+	SUV	Black
3	25-54	SUV	Silver/Gray
4	55-64	SUV	Red
5	65+	SUV	Red
6	25-54	Car	Other
7	65+	Car	Silver/Gray
8	55-64	SUV	Silver/Gray
9	25-54	Truck	Silver/Gray
10	55-64	Truck	Red
11	55-64	SUV	Silver/Gray
12	65+	Truck	White
13	65+	Truck	Other
14	55-64	Truck	White
15	25-54	Truck	Other
16	55-64	SUV	Other
17	65+	Car	Other
18	65+	SUV	Silver/Gray
19	25-54	Truck	White
20	65+	SUV	White

## Step 2

### Part 1

Code

	Cars	SUVs	Trucks	Total
Age 24 or younger	0	0	0	0
Age 25-54	2	1	3	6
Age 55-64	0	4	2	6
Age 65+	2	4	2	8
Total	4	9	7	20

A is highest frequency age which is 65+. B is highest frequency vehicle which is SUVs.

A and B = 1/5

A or B = 13/20

Now A is second highest frequency age which is tied. I will choose 55-64. B is now Trucks.

A and B = 1/10

A or B = 11/20

### Part 2

Code

	White	Silver/Gray	Black	Red	Other	Total
Age 24 or younger	0	0	0	0	0	0
Age 25-54	2	2	0	0	2	6
Age 55-64	1	2	0	2	1	6
Age 65+	2	2	1	1	2	8
Total	5	6	1	3	5	20

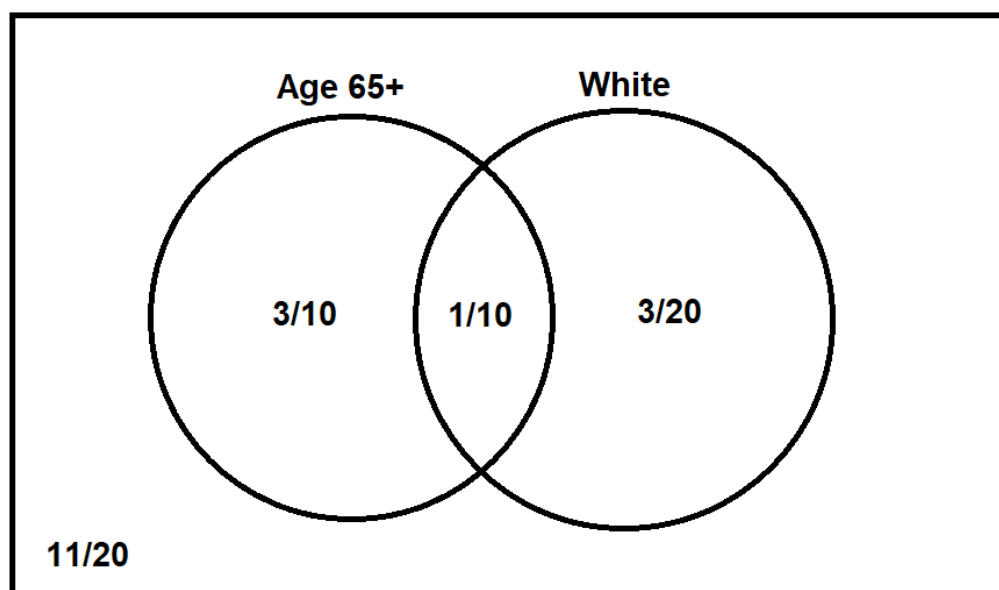
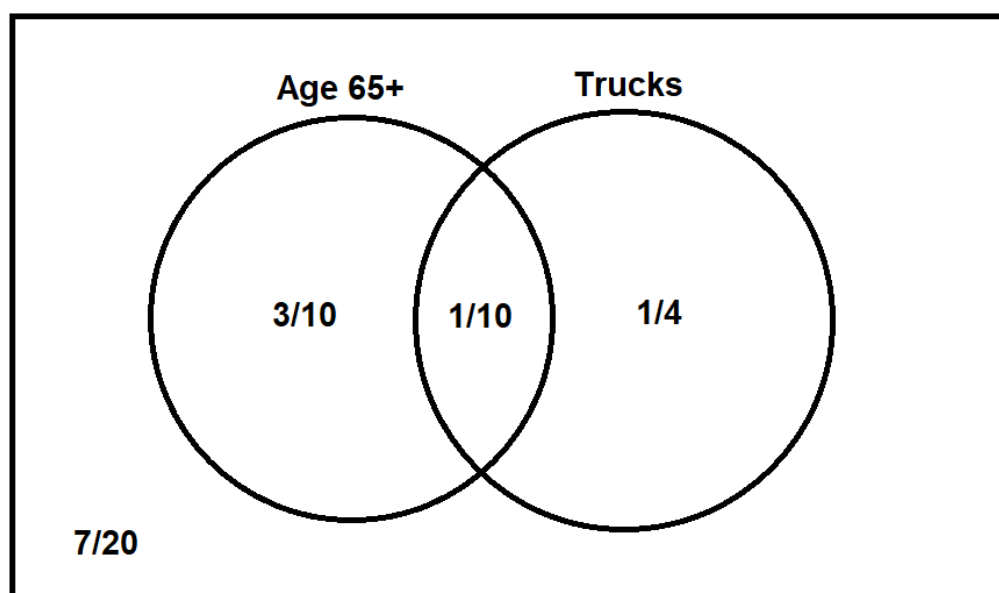
A is Age 65+, C is Silver/Gray.

A and C =  $1/10$  A or C =  $3/5$

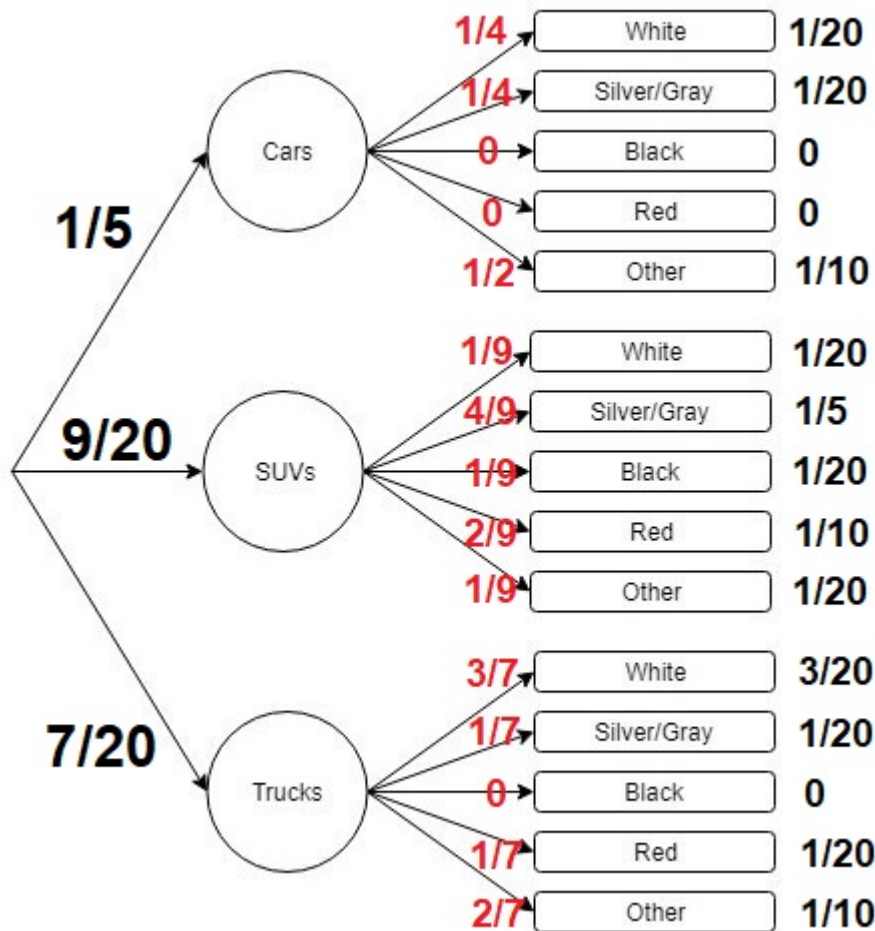
Now A is Age 55-64, C is tied (I chose White).

A and C =  $1/20$  A or C =  $1/2$

### Part 3



# Step 3



B is the event the customer bought an SUV and C is the event that the color (of any purchased vehicle) is Silver/Gray.

$$P(B|C) = 1/5 / 3/10 = 2/3$$

$$P(C|B) = 4/9$$

X is the event that the customer bought a Truck and Y is the event that the color is white.

$$P(X|Y) = 3/20 / 1/4 = 3/5$$

$$P(Y|X) = 3/7$$

$$P(B|Y) = 1/20 / 1/4 = 1/5$$

$$P(Y|B) = 1/9$$

$$P(X|C) = 1/20 / 3/10 = 1/6$$

Determine if B and C are independent using the rule  $P(B|C) = P(B|C^c)$  From the tree you can see taht they aren't independent but proving it using the rule:  $P(B|C) = 2/3$   $P(B|C^c) = 1/4 / 7/10 = 5/14$   $2/3$  doesn't equal  $5/14$ , so they are not independent

Determine if X and Y are independent using the rule  $P(X|Y) = P(X)$  From the tree you can see that they aren't independent but proving it using the rule:  $P(X|Y) = 3/5$   $P(x) = 7/20$   $3/5$  doesn't equal  $7/20$ , so they are not independent

# Conclusion

One could argue that we need more information to best decide what car to use. Customers may dislike their current model, and want to migrate away from it. Advertising the same style car that they already own may discourage them from an upgrade. That being said, I'll assume that you want to pick a car that is most commonly owned among potential customers.

From the results above, the best vehicle for the Brand A marketers to use in their commercial is a Silver/Gray SUV. The vehicle color should be Silver/Gray, as it attracts all age demographics (see table). Also,  $P(X|C)+P(B|C)$  is greater than  $P(B|Y)+P(X|Y)$  showing that it is better than the second best color, white. The vehicle type should be an SUV, as it is the most common vehicle type and  $P(B|C)+P(B|Y)$  is greater than  $P(X|C)+P(X|Y)$ , showing that is better than the second most common vehicle type which is a truck.