**MA 207 Conditional Probability Group Members:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. In a certain city, the police recorded the data in the contingency table below on traffic accidents involving a motorcycle, listing whether the rider wore a helmet (Y) or not (N) and whether they survived (S) or died (D).

|  |  |  |
| --- | --- | --- |
|  | Survived (S) | Died (D) |
| Wore a helmet (Y) | 78 | 2 |
| Didn’t wear a helmet (N) | 19 | 1 |

* 1. True or False: Since there are only two possible outcomes for the survival variable (survived or died), the probability of surviving is ½.
  2. Find P(S) = 97/100 = .97
  3. Find P(S|Y) = 78/80 = .975
  4. Find P(S|N) = 19/20 = .95
  5. True or False: Since more people died who wore a helmet than who did not wear a helmet, it is a bad idea to wear a helmet.
  6. Is P(S) = P(S|Y)? Yes or no?
  7. Are S and Y independent events? Yes or no?
  8. Is there an association between S and Y? Yes or no?
  9. Are S and Y disjoint events? Yes or no? 78 folks in the intersection
  10. Are S and D disjoint events? Yes or no?
  11. Find P(S|D) = 0
  12. Are S and D independent events? Yes or no?
  13. Find P(Y) = 80/100 = .80
  14. Find P(YS) using the Multiplication Rule: P(YS) = P(Y)P(S|Y).

P(YS) = (.80)(.975) = .78

* 1. Find P(YS) using the table.

P(YS) = 78/100 = .78

* 1. Do your answers for j. and k. agree? Should they? Yes & Yes, Yes & No, No & Yes, No & No?
  2. Find P(Y)P(S) = (.80)(.97) = .776
  3. Is P(YS) = P(Y)P(S)? Yes or no?
  4. Find P(Y|S) = 78/97 = .804
  5. Is P(S|Y) = P(Y|S)? Yes or no? Would you expect them to be equal? Yes or no?
  6. Find P(S) by *conditioning* on whether the cyclist wore a helmet.

P(S)=P(S|Y)P(Y) + P(S|N)P(N) = (.975)(.80) + (.95)(.20) = .97

* 1. Does your answer to part q. match your answer to part b.? Should it?

Yes & Yes, Yes & No, No & Yes, No & No?