**Probability rules worksheet #2 SOLUTIONS NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. If P(A) = 0.48 and P(B) = 0.67 and P(A∩B) = 0.22, find the following:

.22

.26

.45

.07

A

B

1. P(A U B) = 0.93
2. P(A U BC) = 0.55
3. P(AC ∩ B) = 0.45
4. P(B|A) = 
5. P(AC|BC) = 
6. Are A and B disjoint events? Why or why not?

Not disjoint. P(A∩B) = 

1. Are A and B independent events? Why or why not?

Not independent. P(B|A) = 0.4583 ≠ P(B) = 0.67

1. If P(G) = 0.18, P(M) = 0.24 and G and M are independent, what’s the probability of G and M?

 P(G∩M) = 0.18 \* 0.24 = 0.0432

1. If P(W) = 0.61 and P(J) = 0.45 and P(J|W) = 0.2, find the following:
2. P(W and J) = 0.61 \* 0.2 = 0.122
3. P(W or J) = 0.61 + 0.45 – 0.122 = 0.938
4. If P(D) = 0.48, P(R) = 0.25 and D and R are disjoint, what is the probability of D or R?

P(D U R) = 0.73

1. Suppose in a library 23% of the books are children’s books, 42% of the books are adult fiction, and the rest are non-fiction.
2. What is the probability that a randomly selected book is:
3. Non-fiction

P(NF) = 0.35

1. Not a children’s book

P(CC) = 0.77

1. A children’s book or an adult fiction

P(C U AF) = 0.65

1. If the type of book is independent of the next what is the probability that:
2. 2 randomly selected books are both children’s books?

P(C ∩ C) = 0.23 \* 0.23 = 0.0529

1. 2 randomly selected books are fiction then non-fiction?

P(AF ∩ NF) = 0.42 \* 0.35 = 0.147

1. 2 randomly selected books are children’s and adult fiction?

P(C ∩ AF) = 2(0.23)(0.42) = 0.1932

1. 2 randomly selected books are not adult fiction?

P(AFC ∩ AFC) = (0.58)(0.58) = 0.3364

1. At least 1 out of 4 randomly selected books is a children’s book?

P(at least 1 C) = 1 – P(CC ∩ CC ∩ CC ∩ CC) = 1 – (0.77)4 = 0.6485

1. The first non-fiction book is the 5th one selected?

P(NFC ∩ NFC ∩ NFC ∩ NFC ∩ NF) = (0.65)4(0.35) = 0.0625

1. In a large university 13.5% of the students take economics, 24.7% of the

.117

.018

.130

.735

E

S

students take statistics, and 11.7% take economics and statistics.

1. Draw a Venn Diagram
2. What is the probability that a randomly selected student:
3. Took economics or statistics?

P(E U S) = 0.265

1. Didn’t take economics but did take statistics?

P(EC ∩ S) = 0.130

1. Didn’t take economics or didn’t take statistics?

P(EC U SC) = 0.883

1. That took statistics didn’t take economics?

P(EC|S) = 

1. Didn’t take statistics given they took economics?

P(SC|E) = 

1. Is taking statistics and economics mutually exclusive? independent?

Not mutually e

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Frequently | Occasionally  | Not at all | Total |
| Male | 221 | 456 | 795 | 1472 |
| Female | 207 | 430 | 741 | 1378 |
| Total | 428 | 886 | 1536 | 2850 |

1. The following table shows the results of survey that asked people whether they were involved in any type of charity work.

What is the probability that

1. a randomly selected person is male and frequently involved in charity work?

P(M ∩ Fr) = 

1. a randomly selected person is male or occasionally involved in charity work?

P(M U O) = 

1. a randomly selected person is female or not involved in charity work?

P(F U N) = 

1. a randomly selected person is male given they frequently involved in charity work?

P(M|Fr) = 

1. a randomly selected female is occasionally involved in charity work?

P(O|F) = 

1. a person not involved in charity is female?

P(F|N) = 

1. Is sex and involvement in charity independent? Disjoint?

They are independent. P(F|N) = 0.4824 = P(F) = 0.4835

They are not disjoint. P(M ∩ Fr) = 0.0775 ≠ 0