CSCI 1900 - Homework 3-B

**Section 2.2: Operations on Sets** *(31 points)*

1. Let *U = { a, b, c, d, e, f, g, h, k } A = { a, g, h, k } B = {b, c, f, h } C = { a, e, g }*and *D = {d, g, h }* Compute the following (8)

 a. 

 b. 

 c. 

 d. 

e*. *

 f. 

 g. 

 h. 

2. Let U = { 1, 2, 3, 4, 5, 6, 7, 8, 9 } A = {1, 2, 3, 7} B = {4, 5, 6, 7 } C = { 1, 3, 6 } Compute the following (6)

 a. $\overbar{A }∪\overbar{B }$

 b. $\overbar{B }∩\overbar{C }$

 c. $\overbar{A∩B}$

 d. $\overbar{A∪A}$

e*.* $A⊕B$

 f. $B⊕C$

3. State De Morgan’s laws (as are applicable to sets) with two English sentences. (2)

4. Verify the Addition Principle for the following two sets. Verify means to show that it is true for the two sets. (1)

$$A= \left\{ 1, 2, 5, 6 \right\} B= \left\{2, 4, 6, 7\right\}$$

5. Verify the Addition Principle for the following three sets. (1)

$$C= \left\{a, c, e, f, g, h\right\} D= \left\{b, c, d, g, k\right\} E= \left\{a, b, f, g, h ,k\right\}$$

6. Among a recent survey of 600 people showed: 300 owned cats, 250 owned dogs, 50 owned both. (2)

a. How many of those surveyed had either a cat or a dog, but not both?

b. How many of those surveyed had neither a cat nor a dog?

7. A recent survey of 454 ETSU freshman revealed: 142 students like Slim Jims, 122 students like Fried Pork Rinds, 174 students liked Pickled Hard Boiled Eggs, 27 liked Slim Jims and Fried Pork Rinds, 33 liked Slim Jims and Pickled Hard Boiled Eggs, 44 liked Fried Pork Rinds and Pickled Hard Boiled Eggs and 98 do not like any of the three “snacks.” (2)

a. How many students like all three kinds of snacks?

b. How many students like exactly 1 type of snack?

8. Analysis of reenrollment data for a Computer Science Department at a major university yielded the following table:

|  |  |
| --- | --- |
|  | **Concentration** |
| **Sex** | CS (C) | IS (S) | IT (T) |
| Male (M) | 43 | 19 | 96 |
| Female (F) | 17 | 10 | 31 |

For each of the following sets, give the English description and the number of students in the set. (6)

a. $F∩T$

b. $\overbar{M∪C}$

c. $\left(F∪T\right) ∩ \overbar{S}$

9. Complete the following proof, by filling in the blanks. (3)

 Suppose we wish to prove that $A∪B =B∪A$, for two non empty sets I and *B.*

|  |  |
| --- | --- |
| Statement | Justification |
| Let $x ϵ$ \_\_\_\_\_\_\_\_\_\_\_\_\_ | Given |
| $$x ϵ A or x ϵ B $$ | Definition of a union |
| Case 1: $x ϵ A$ |  |
| $$x ϵ B ∪A$$ | \_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Since *x* is arbitrary, must be true of all x | Inclusion |
| $∴$ $A∪B =B∪A$ | Definition of union |
| Case 2: \_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
| $$x ϵ B ∪A$$ | Defintion of union |
| Since *x* is arbitrary, must be true of all x | Inclusion |
| $∴$ $A∪B =B∪A$ | Definition of union |
|  |  |