Year End Review: Set Theory (Unit 1)

It is important to be able to determine the inverse, converse, contrapositive, and biconditional of statements.

Inverse – formed by negating both the hypothesis and conclusion

Contrapositive – formed by negating both the hypothesis and conclusion of the converse.

Converse – formed by switching the hypothesis and conclusion

Biconditional – a conditional statement whose converse is also true

Example 1: Determine the inverse, converse, and contrapositive of the following statement:

If you are in Yellowknife, then you are in the Northwest Territories.

Inverse – If you are not in Yellowknife, then you are not in the NT.

Converse – If you are in the NT, then you are in Yellowknife

Contrapositive – If you are not in the NT, then you are not in Yellowknife

Example 2: Is the above statement biconditional. No

A Venn diagram is a diagram where the elements of sets are represented by points within closed loops. It offers a convenient way to demonstrate abstract relationships in a concrete fashion.

Example 3: A total of 155 students attended a three-day information session on working in developing countries. The three countries featured were Mali, India, and Vietnam. One country was featured per day.

- 45 attended the session on Mali, 40 on India, and 35 on Vietnam
- 10 attended the session on Mali and India
- 15 attended the session on Mali and Vietnam
- 12 attended the session on India and Vietnam
- All students attended at least one session

How many students attended all three sessions?

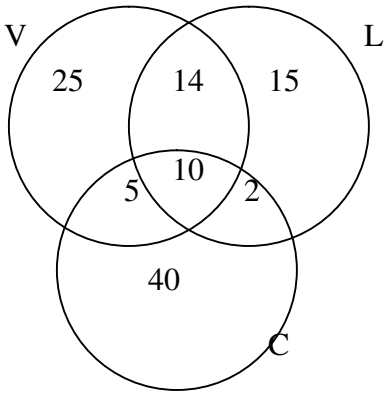
$n(M \cup I \cup V) = n(M) + n(I) + n(V) - n(M \cap I) - n(M \cap V) - n(I \cap V) + n(M \cap I \cap V)$

$155 = 45 + 40 + 35 - 10 - 15 - 12 + x$

$155 = 83 + x$

$72 = x$

Example 4: Creative Cupcakes sells vanilla, chocolate, and lemon cupcakes. On Monday, customer sales were as shown in the Venn diagram. Determine each amount.



a) n((V U C) \ L)

$25 + 14 + 5 + 10 + 2 + 40 - 14 - 10 - 2 = 70$

b) n((L U V) \ C) $25 + 14 + 15 + 5 + 10 + 2 - 2 - 10 - 5 = 54$

c) n((V U C) U (V U L))

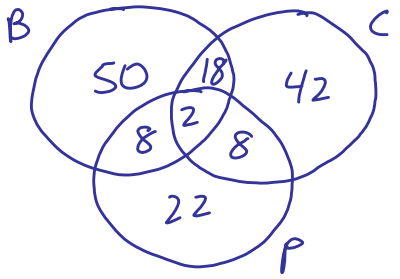
$25 + 14 + 5 + 10 + 2 + 40 + 15 = 111$

d) n(L \ V \ C) 15

Example 5: There are 155 Grade 12 students at Westdale High. The number of students enrolled in the following courses is shown.

- 78 in biology
- 70 in chemistry
- 40 in physics
- 2 in all three sciences
- 20 in biology and chemistry
- 10 in chemistry and physics
- 10 in biology and physics

a) Complete the Venn diagram to illustrate the situation.



b) How many students do not take any of the three science courses?

155 - all = 5