## Question 1
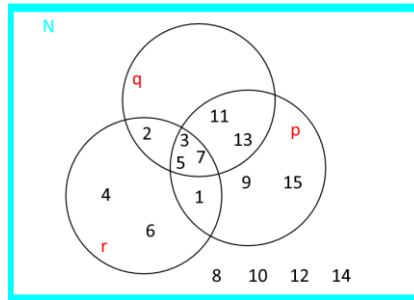
Let us start by declaring our variables: A = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15} and:

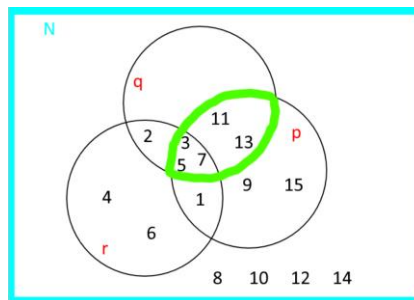p – "n is an odd number" => p = {1, 3, 5, 7, 9, 11, 13, 15}

q – "n is a prime number" => q = {2, 3, 5, 7, 11, 13}

r – "n is less than 8" => r = {1, 2, 3, 4, 5, 6, 7}



a)   p ^ q = {3, 5, 7, 11, 13}



p ⊕ q = {1, 2, 9, 15}
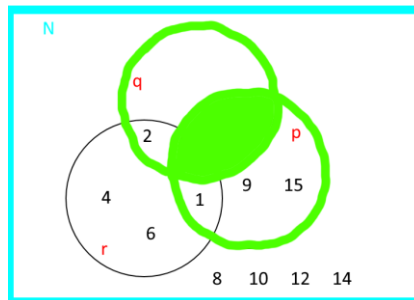


p -> q = {2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14}
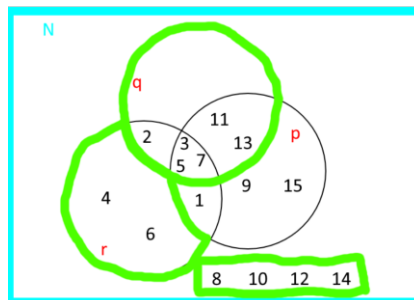


r -> q = {2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15}
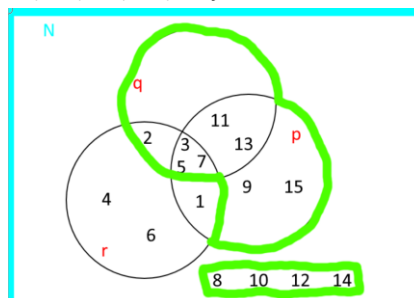
b) "n is neither odd nor is a prime" = ¬(p v  q);
   "if n is odd and less than 8 than n is a prime number" = ( p ^ r ) -> q;
   "n is a prime number only if n is odd" = (q -> p);
   "n is a prime number if n is odd" = (p -> q);

c) Contrapositive of the "q -> p" = (¬p -> ¬q);
   In words it can mean: "if n is even then then it is not a prime number".

## Question 2

(p -> q) = ¬p v q => (p -> q) ∧ p => (¬p v q) ∧ p => (¬p ∧ p) v (q ∧ p) => F v (q ∧ p) => (q ∧ p) => (q ∧ p) = (p ∧ q)

| p | q | p -> q | ¬p | ¬p v q |
|---|---|--------|----|--------|
| 1 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 |
| 0 | 0 | 1 | 1 | 1 |