UTM
UNIVERSITI TEKNOLOGI MALAYSIA

School of Computing
Faculty of Engineering

DISCRETE SRUCTURE (SECI1013) – SECTION 7
2019/2020 SEMESTER 1

TUTORIAL 1.1

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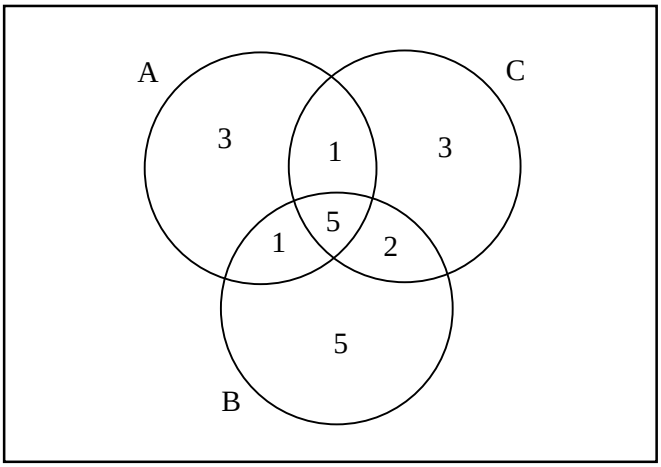
ANSWER

1. a) B = {-5, -4, -3, -2, -1, 1, 2, 3, 4, 5}

   b) C = { $\frac{2}{3}, \frac{4}{3}, 2, \frac{8}{3}, \frac{10}{3}, 4, \frac{14}{3}, \frac{16}{3}, 6, \frac{20}{3}, \frac{22}{3}, 8, \frac{26}{3}, \frac{28}{3}, 10, \frac{32}{3}, \frac{34}{3}, 12, \frac{38}{3}, \frac{40}{3}, 14, \frac{44}{3}, \frac{46}{3},$
   $16, \frac{50}{3}, \frac{52}{3}, 18, \frac{56}{3}, \frac{58}{3}, 20, \frac{62}{3}, \frac{64}{3}, 22, \frac{68}{3}, \frac{70}{3}, 24, \frac{74}{3}, \frac{76}{3}, 26, \frac{80}{3}, \frac{82}{3}, 28, \frac{86}{3}, \frac{88}{3},$
   $30, \frac{92}{3}, \frac{94}{3}, 32, \frac{98}{3}, \frac{100}{3}$ }

2. 

   A = Cats
   B = Rabbits
   C = Hamsters

   People that own two types of pets:

   20 – 5 – 3 – 5 – 3 = 4 people

   ∴ Total pets: (5 × 3) + 3 + 5 + 3 + (4 × 2) = 34 pets

3. | | |
   |---|---|
   | (A ∩ B) ∪ (A' ∪ B)' | *De Morgan's laws* |
   | = (A ∩ B) ∪ ((A')' ∪ B') | *Double complement laws* |
   | = (A ∩ B) ∪ (A ∪ B') | *Distributive laws* |
   | = (A ∪ A) ∩ (B ∪ B') | *Idempotent laws* |
   | = A ∩ (B ∪ B') | *Complement laws* |
   | = A ∩ *U* | *Properties of universal set* |
   | = A | |

4. $a = 2n + 1$

$b = 2n + 1$

$a \times b = (2n + 1)(2n + 1)$

$a \times b = (2n + 1)^2$

$a \times b = 4n^2 + 4n + 1$

$a \times b = 2(2n^2 + 2n) + 1$

$a \times b = 2m + 1$ where $m = 2n^2 + 2n$

$\therefore a \times b$ is an odd integer

Prove:

$a = 2n + 1$	$b = 2n + 1$	$a \times b$
$a = 2(3) + 1$	$b = 2(5) + 1$	$= 7 \times 11$
$a = 7$	$b = 11$	$= 77$

5. p = I shop online

q = I purchase goods

r = I receive my allowance

a) $r \rightarrow q \wedge \neg p$

b) $r \wedge \neg q \vee \neg p$

6. a) The domain of x is all students at your college.

Let $M(x) = x$ is all students attend class on Monday,

$N(x) = x$ attend class in the morning

$\therefore \forall x (M(x) \rightarrow N(x))$

b) The domain of x is all integer

$x^2 + 2x - 3 = 0$

$(x + 3)(x - 1) = 0$

$x = -3$ or $x = 1$

If $P(x)$ is predicate $x^2 + 2x - 3 = 0$, the $\exists x P(x)$ is true since $P(1)$ and $P(-3)$ are true.

$\therefore \exists x P(x)$

c) The domain of x is all flowers

Let $G(x) = x$ is all red flowers,

$H(x) = x$ is edible

$\therefore \exists x\,(G(x) \wedge H(x))$