

Question 1. [6 MARKS]**Part (a)** [1 MARK]

C is true.

Part (b) [1 MARK]

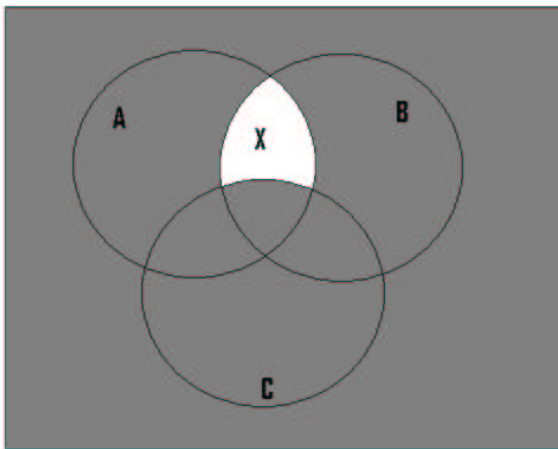
Nothing

Part (c) [2 MARKS]

If it's not true that not A or not B, then C.

or

If not C, then not A or not B.

Part (d) [2 MARKS]**Question 2.** [8 MARKS]**Part (a)** [2 MARKS]

$$\neg \exists x \in P, T(x, x)$$

or

$$\forall x \in P, \neg T(x, x)$$

Part (b) [2 MARKS]

$$\exists x \in P, \forall y \in P, T(x, y)$$

Part (c) [2 MARKS]

$$\forall y \in P, \exists x \in P, T(x, y)$$

Part (d) [2 MARKS]

$$\neg \exists y \in P, T(\text{Jean}, y)$$

or

$$\forall y \in P, \neg T(\text{Jean}, y)$$

Question 3. [3 MARKS]

Note: there's a { missing. If we go by the indentation:

```
return (A && !B && (C || !D)) || !A;
```

or

```
return (!B && (C || !D)) || !A;
```

Question 4. [8 MARKS]**Part (a)** [2 MARKS]
$$\forall i \in \mathbb{N}, \exists j \in \mathbb{N}, a_j > i \wedge j \leq i$$
Part (b) [4 MARKS]

False.

True. For example, $i = 8$.

Part (c) [2 MARKS]

Let $i = \underline{\quad}$.

\implies so $i \in \mathbb{N}$.

Let $j \in \mathbb{N}$.

Suppose $a_j > i$.

—

Then $j > i$.

So $a_j > i \rightarrow j > i$.

Since j is an arbitrary element of \mathbb{N} :

$$\forall j \in \mathbb{N}, a_j > i \rightarrow j > i.$$

Since $i \in \mathbb{N}$, and $\forall j \in \mathbb{N}, a_j > i \rightarrow j > i$:

$$\exists i \in \mathbb{N}, \forall j \in \mathbb{N}, a_j > i \rightarrow j > i.$$

Total Marks = 25