Question 1. [6 MARKS]

Part (a) [1 MARK]

Nothing

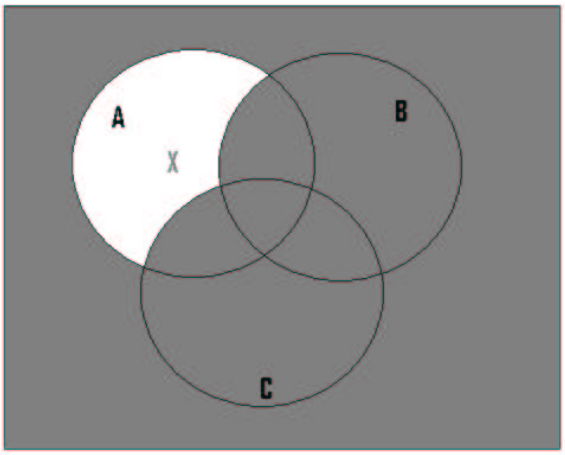
Part (b) [1 MARK]

B or C is true.

Part (c) [2 MARKS]

If A, then not, not B and not C.
or
If not B and not C, then not A.

Part (d) [2 MARKS]



Question 2. [8 MARKS]

Part (a) [2 MARKS]

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

Part (b) [2 MARKS]

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

Part (c) [2 MARKS]

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

Part (d) [2 MARKS]

$\neg\exists y \in P, T(Terry, y)$
or
$\forall y \in P, \neg T(Terry, y)$

Question 3. [3 MARKS]

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

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

Question 4. [8 MARKS]

Part (a) [2 MARKS]

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

Part (b) [4 MARKS]

False. $i = 8$ is a counterexample.

True.

Part (c) [2 MARKS]

Let $i \in \mathbb{N}$.
  Let $j =$ __.
    __, so $j \in \mathbb{N}$.
    __
    So $a_j > i$.
    __
    So $j \leq i$.
  So $a_j > i \wedge j \leq i$.
  Since $j \in \mathbb{N}$:
    $\exists j \in \mathbb{N}, a_j > i \wedge j \leq i$.
Since i is an arbitrary element of $\mathbb{N}$:
  $\forall i \in N, \exists j \in \mathbb{N}, a_j > i \wedge j \leq i$.

Total Marks = 25