

Answers for Quiz 3

David Menendez

1. $(p \wedge (p \rightarrow q) \wedge (q \rightarrow r)) \rightarrow r$

Note that this is also: $p, p \rightarrow q, q \rightarrow r \vdash r$.

1		p	
2		$p \rightarrow q$	
3		$q \rightarrow r$	
4		q	$\rightarrow E$ 1,2
5		r	$\rightarrow E$ 3,4

2. (a) Given $A = \{2, 5, 7, 8\}$, $B = \{2, 5, 4\}$, and $C = \{5, 10, 1\}$:

$$B - A = \{4\}$$

$$C - A = \{1, 10\}$$

$$(B - A) \cup (C - A) = \{1, 4, 10\}$$

$$B \cup C = \{1, 2, 4, 5, 10\}$$

$$(B \cup C) - A = \{1, 4, 10\}$$

$$\therefore (B - A) \cup (C - A) = (B \cup C) - A.$$

(b) Show $(B - A) \cup (C - A) = (B \cup C) - A$:

$$\begin{aligned} (B - A) \cup (C - A) &= (B \cap \bar{A}) \cup (C \cap \bar{A}) && \text{definition of set difference} \\ &= (B \cup C) \cap \bar{A} && \text{distribution} \\ &= (B \cup C) - A && \text{definition of set difference} \end{aligned}$$