

Quiz 2

Cpr E 310

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$$1.) \text{ a.) (i) } P(2) = 2+1=3 \cdot 2 = 3=6 = F \\ \text{ so } \forall x P(x) = F$$

$$\text{ (ii) } P(x) = x+1=3x = 1=2x \quad x=\frac{1}{2} \quad \& \quad P(\frac{1}{2})=T \\ \text{ so } \exists x P(x) = T$$

$$\text{ b.) (i) } P(2)=F \quad \text{ so } \forall x P(x)=F$$

(ii) The only answer for x that make $P(x)$ true
is $x=\frac{1}{2}$. This isn't in the domain so

$$\exists x P(x) = F$$

2.)

$$\begin{array}{c} a \rightarrow r \\ b \rightarrow r \\ \hline \neg(a \vee b) \end{array} \quad \begin{array}{c} \neg(a \rightarrow r) \wedge (b \rightarrow r) \wedge \neg(a \vee b) \end{array} \rightarrow \neg r \\ \therefore \neg r \quad \begin{array}{c} a=F \quad b=F \quad r=T \\ (\top \wedge \top \wedge \top) \rightarrow \top \\ \top \rightarrow F \quad \top \neq F \end{array}$$

so the conclusion is false

- 3.) a: rained b: foggy c: sailing d: lifeguard
e: Trophy

$$\begin{array}{c} (\neg a \vee \neg b) \rightarrow (c \wedge d) \\ c \rightarrow e \\ \hline \therefore a \end{array}$$

$$\begin{array}{c} c \rightarrow e \equiv \neg c \rightarrow \neg e \\ \neg e \rightarrow \neg c \\ \hline \therefore \neg c \end{array} \quad \begin{array}{c} \text{modus} \\ \text{ponens} \end{array}$$

3.) continued

$$(\neg a \vee \neg b) \rightarrow (\neg a \wedge \neg b) \equiv (\neg a \vee \neg b) \rightarrow (a \wedge b)$$

$$(\neg a \vee \neg b) \rightarrow (\neg a \wedge \neg b)$$

$$\frac{\neg a}{\therefore a}$$

$$\frac{\neg a}{\therefore \neg a \vee \neg b}$$

addition

$$\frac{(\neg a \vee \neg b) \rightarrow (a \wedge b)}{\therefore a}$$

Modus
ponens

=

$$\frac{a \wedge b}{\therefore a}$$

simplification

$$\frac{a}{\therefore a}$$