

M325 K HW #3; Sec 3.4 Solutions SPRING 2024

#4. $(3^{\frac{1}{2}})^6 = 3^{(\frac{1}{2} \cdot 6)}$

#6. This program is not correct.

#12. ALL HONEST PEOPLE PAY THEIR TAXES. \equiv If a person is honest, then he pays taxes.

DARTH IS NOT HONEST
 \therefore DARTH DOES NOT PAY HIS TAXES.

Let $P(x) =$ "x is honest"
 $Q(x) =$ "x pays taxes"

Form: \forall persons $x, P(x) \rightarrow Q(x)$
 $\sim P(\text{DARTH})$
 $\therefore \sim Q(\text{DARTH})$

THIS IS INVALID. IT IS AN EXAMPLE OF THE UNIVERSAL INVERSE ERROR.

#13 The ARGUMENT IS VALID. It is an example of UNIVERSAL MODUS PONENS.

(NOT ASSIGNED)

#14 This ARGUMENT IS INVALID. It is an example of UNIVERSAL CONVERSE ERROR.

Sec 3.4, #19

#19 There are two ways to analyze this argument, both correct, leading to different forms.

In both methods, x represents a car,

P(x) = "x is a good car" and
Q(x) = "x is a cheap car."

Method 1: "No good car is cheap" is equivalent to " $\forall x, P(x) \rightarrow \sim Q(x)$ ".

THE ARGUMENTS HAVE THE FORMS:

a) $\forall x, P(x) \rightarrow \sim Q(x)$
P(Rimbaud)
 $\therefore \sim Q(\text{Rimbaud})$ } Valid by
UNIVERSAL
Modus Ponens.

b) $\forall x, P(x) \rightarrow \sim Q(x)$
 $\sim Q(\text{Simbaru})$
 $\therefore P(\text{Simbaru})$ } INVALID by
UNIVERSAL
CONVERSE ERROR

c) $\forall x, P(x) \rightarrow \sim Q(x)$
Q(VX ROADSTER)
 $\therefore \sim P(\text{VX ROADSTER})$ } VALID by
UNIVERSAL
MODUS TOLLENS

d) $\forall x, P(x) \rightarrow \sim Q(x)$
 $\sim P(\text{OMNEX})$
 $\therefore Q(\text{OMNEX})$ } INVALID by
UNIVERSAL
INVERSE ERROR

Method 2: "No good car is cheap"
 is equivalent to, " $\forall x, Q(x) \rightarrow \sim P(x)$ "

The Arguments have the forms:

$\begin{array}{l} a) \forall x, Q(x) \rightarrow \sim P(x) \\ \hline P(\text{Rimbaud}) \\ \therefore \sim Q(\text{Rimbaud}) \end{array}$	}	Valid by UNIVERSAL MODUS TOLLENS
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$\begin{array}{l} b) \forall x, Q(x) \rightarrow \sim P(x) \\ \hline \sim Q(\text{Simbaru}) \\ \therefore P(\text{Simbaru}) \end{array}$	}	INVALID by UNIVERSAL INVERSE ERROR
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$\begin{array}{l} c) \forall x, Q(x) \rightarrow \sim P(x) \\ \hline Q(\text{UX ROADSTER}) \\ \therefore \sim P(\text{UX ROADSTER}) \end{array}$	}	Valid by UNIVERSAL MODUS TOLLENS
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$\begin{array}{l} d) \forall x, Q(x) \rightarrow \sim P(x) \\ \hline \sim P(\text{Omnes}) \\ \therefore Q(\text{Omnes}) \end{array}$	}	INVALID by UNIVERSAL CONVERSE ERROR
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