

Question 1.2

The problem

Q1.2 There is a cat that doesn't purr. Every cat that is happy or hungry, purrs. Therefore, there is a cat that isn't happy.

Let $P(x)$ be "x purrs", $H(x)$ be "x is happy", $G(x)$ be "x is hungry", the domain is all cats.

Compound Logic Form: $(\exists x \neg P(x) \wedge \forall x (H(x) \vee G(x) \vee P(x))) \rightarrow \exists x \neg H(x)$

Argument Form:

$$\frac{\begin{array}{l} \exists x \neg P(x) \\ \forall x (H(x) \vee G(x) \vee P(x)) \end{array}}{\therefore \exists x \neg H(x)}$$

Validate Argument:

Proof.

$\exists x \neg P(x)$	Hypothesis
$\forall x (H(x) \vee G(x) \vee P(x))$	Hypothesis
$\neg P(a)$	Existential Instantiation
$H(a) \vee G(a) \vee P(a)$	Universal Instantiation
$\neg H(a)$	Modus Tollens
<div style="border: 1px solid black; padding: 2px;">$\exists x \neg H(x)$</div>	Existential Generalization

□