Math 2283 - Introduction to Logic

Quiz #7 - 2015.09.18 Solutions

Express the following quantified statements in an English phrase (e.g 'there is at least one', 'there are exactly two'). Here, $P(x)$ is read as 'x has the property P'.

1. $\underset{x}{\mathbf{E}}\ P(x)$

   There is at least one thing which has the property P.

2. $\underset{x}{\mathbf{E}}\ \sim P(x)$

   Not all things have the property P.

3. $\underset{x}{\mathbf{A}}\ \sim P(x)$

   Nothing has the property P.

4. $\underset{x,y}{\mathbf{E}}\ P(x) \wedge P(y) \wedge \sim (x = y)$

   At least two distinct things have the property P.

5. $\underset{x,y}{\mathbf{A}}\ [P(x) \wedge P(y)] \rightarrow\ (x = y)$

   At most one thing has the property P.

6. $\underset{x}{\mathbf{E}}\,\underset{y}{\mathbf{A}}\ P(x) \wedge (P(y) \rightarrow\ (y = x))$

   Exactly one thing has the property P.