

Math 131 - Dr. Miller - Activity #6 Truth Values with Multiple Quantifiers - Fall 2024

For each statement below, FIRST rewrite it informally, THEN decide whether it's true or false and justify your claim. The questions use the Tarski World diagram and cafeteria meal list on the back.

1.  $\forall x, \forall y, \text{SameColor}(x, y)$ .

2.  $\forall$  squares  $x, \exists y$  such that  $\text{Circle}(y) \wedge \text{DifferentColor}(x, y)$ .

3.  $\exists$  circle  $x$  such that  $\forall$  triangles  $y, \text{Above}(x, y)$ .

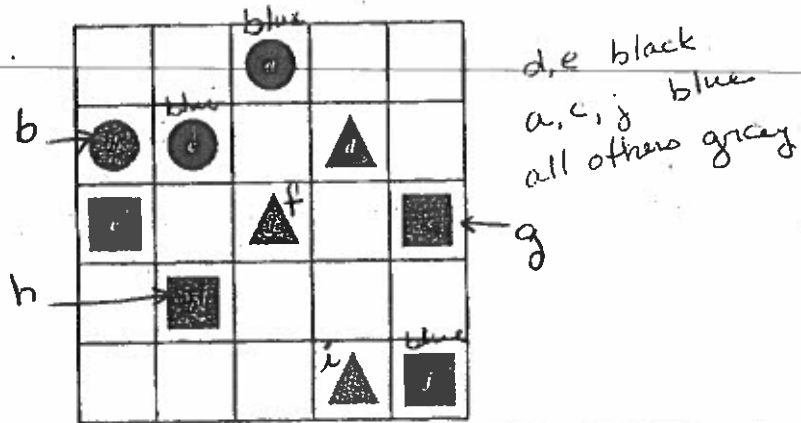
4.  $\forall$  students  $S, \exists$  a salad  $T$  such that  $S$  chose  $T$ . (text Example 3.3.3)

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5.  $\exists$  an item  $I$  such that  $\forall$  students  $S, S$  did not choose  $I$ . (text Example 3.3.3)

**Example 3.3.8 Negating Statements in a Tarski World**

Refer to the Tarski world of Figure 3.3.1, which is reprinted here for reference.



**Example 3.3.3 Interpreting Multiply-Quantified\* Statements**

A college cafeteria line has four stations: salads, main courses, desserts, and beverages. The salad station offers a choice of green salad or fruit salad; the main course station offers spaghetti or fish; the dessert station offers pie or cake; and the beverage station offers milk, soda, or coffee. Three students, Uta, Tim, and Yuen, go through the line and make the following choices:

Uta: green salad, spaghetti, pie, milk

Tim: fruit salad, fish, pie, cake, milk, coffee

Yuen: spaghetti, fish, pie, soda

These choices are illustrated in Figure 3.3.2.

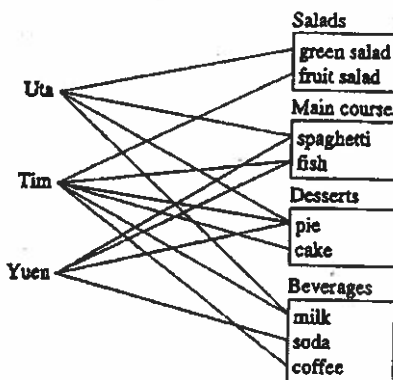


Figure 3.3.2