

Practice with Quantifiers
CSC-014, Dr. Ostheimer

Here is are some old exam questions for you to try.

1. Which of the following statements are propositions? And of those that are propositions, which are true? Assume in all cases that the universe of discourse is the set of positive integers.
 - (a) $x = y^3$
 - (b) $\exists x \text{ s.t. } x = y^3$
 - (c) $\forall y, \exists x \text{ s.t. } x = y^3$
 - (d) $\forall x, \exists y \text{ s.t. } x = y^3$
 - (e) $\exists x \text{ s.t. } \forall y, x = y^3$
2. Let the universe of discourse be the set of research mathematicians. Let $F(x, y)$ be the statement “ x was a Ph.D. student of y .” Another way that we word $F(x, y)$ is to say that “ y was the Ph.D. supervisor of x .” Let $S(x)$ be the statement “ x has spoken at the New York Group Theory Seminar.” Translate the following English sentences into logical notation.
 - (a) All of Dr. Baumslag’s Ph.D. students have spoken at the New York Group Theory Seminar.
 - (b) Not everyone who has spoken at the New York Group Theory Seminar was a Ph.D. student of Dr. Baumslag.
 - (c) Some of the mathematicians who have spoken at the New York Group Theory Seminar have not supervised a Ph.D. student.