

Quantifiers Exercises

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Exercise 1

Determine the truth value of each of the following statements if the domain consists of:

\mathbb{Z}

\mathbb{R}

1 $\forall x(x^2 \geq 0)$

2 $\exists x(x^3 = -1)$

3 $\forall x((-x)^2 = x^2)$

4 $\exists n(n^2 = 2)$

5 $\forall x(x^2 + 2 \geq 1)$

6 $\forall x(x^2 \neq x)$

7 $\forall x(2x > x)$

8 $\exists n(n = -n)$

9 $\exists n(2n = 3n)$

10 $\forall x(x > 0 \vee x < 0)$

Exercise 2

Determine the truth value of each of the following statements if the domain consists of:

\mathbb{Z}

\mathbb{R}

- 1 $\forall x \exists y (x^2 < y)$
- 2 $\exists y \forall x (xy = x)$
- 3 $\exists x \exists y (x^2 + y^2 = 5)$
- 4 $\forall x \exists y (x + y = 0)$

Exercise 3

Translate the paragraph to logical expressions.

- 1 Randy works hard. If Randy works hard, then he is a dull boy. If Randy is a dull boy, he will get the job. Randy did not get the job.
- 2 No man is an island. Manhattan is an island. Manhattan is not a man.
- 3 All men are mortal. Socrates is a man. Socrates is mortal.
- 4 Someone in this class enjoys whale watching. Every person who enjoys whale watching cares about ocean pollution. There is a person in this class who cares about ocean pollution.
- 5 Each of the 93 students in this class owns a personal computer. Everyone who owns a personal computer can use a word processing program. Zeke, a student in this class, can use a word processing program.

References



[Rosen, 2007] Kenneth Rosen.

Discrete Mathematics and Its Applications 7th edition, 2007