Exercises 1.4

1. Let P(x) denote the statement "$x \leq 4$." What are these truth values?

a) P(0)

T

3. Let Q(x, y) denote the statement "x is the capital of y." What are these truth values?

a) Q(Denver, Colorado)

T

5. Let P(x) be the statement "x spends more than five hours every weekday in class," where the domain or x consists of all students. Express each of these quantifications in English.

a) $\exists x P(x)$

There is a student spends more than five hours every weekday in class.

7. Translate these statements into English, where C(x) is "x is a comedian" and F(x) is "x is funny" and the domain consists of all people.

a) $\forall x(C(x) \rightarrow F(x))$

Every commedian is funny.

Exercises 1.5

1. Translate these statements into English, where the domain for each variable consists of all real numbers.

a) $\forall x \exists y(x < y)$

For every real number x there exists a real number y such that x is less than y.

3. Let Q(x, y) be the statement "x has sent an e-mail message to y," where the domain for both x and y consists of all students in your class. Express each of these quantifications in English.

a) $\exists x \exists y Q(x, y)$

There is some student has sent an email message to some student in your class

5. Let W(x, y) mean that student x has visited website y, where the domain for x consists of all students in your school and the domain for y consists of all websites. Express each of these statements by a simple English sentence.

a) W(Sarah Smith, www.att.com)

Sarah Smith has visited www.att.com.

9. Let L(x, y) be the statement “x loves y,” where the domain for both x and y consists of all people in the world. Use quantifiers to express each of these statements.

a) Everybody loves Jerry.

$\forall x \; L(x, \text{Jerry})$

b) Everybody loves somebody.

$\forall x \; \exists y \; L(x, y)$