

Discrete Mathematics: HW2

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1.4 Predicates and Quantifiers

- 6 Let $N(x)$ be the statement " x has visited North Dakota," where the domain consists of the students in your school. Express each of these quantifications in English.
- d. $\exists x \neg N(x)$
 - e. $\neg \forall x N(x)$
 - f. $\forall x \neg N(x)$
- 8 Translate these statements into English, where $R(x)$ is " x is a rabbit" and $H(x)$ is " x hops" and the domain consists of all animals.
- c. $\exists x (R(x) \rightarrow H(x))$
 - d. $\exists x (R(x) \wedge H(x))$
- 10 Let $C(x)$ be the statement " x has a cat," let $D(x)$ be the statement " x has a dog," and let $F(x)$ be the statement " x has a ferret." Express each of these statements in terms of $C(x)$, $D(x)$, $F(x)$, quantifiers, and logical connectives. Let the domain consist of all students in your class.
- a. A student in your class has a cat, a dog, and a ferret.
 - c. Some student in your class has a cat and a ferret, but not a dog.
 - e. For each of the three animals, cats, dogs, and ferrets, there is a student in your class who has this animal as a pet.
- 14 Determine the truth value of each of these statements if the domain consists of all real numbers.
- a. $\exists x (x^3 = -1)$
 - b. $\exists x (x^4 < x^2)$
- 24 c.
d.
- 28 a.
b.
- 34 c.
d.
- 40 a.
b.
- 42 c.
d.

1.5

- 4 b.
c.
d.

- 8 a.
b.
- 12 f.
g.
i.
- 18 a.
c.
- 24 a.
b.
- 28 c.
d.
e.
- 30 a.
b.
c.
- 36 a.
b.