

Assignment 2 part 1

Thursday, January 19, 2017 1:09 AM

Set 3.1: 18 Set 3.2: 2,4

3.1

18. Let D be the set of all students at your school, and let $M(s)$ be "s is a math major," let $C(s)$ be "s is a computer science student," and let $E(s)$ be "s is an engineering student." Express each of the following statements using quantifiers, variables, and the predicates $M(s)$, $C(s)$, and $E(s)$.

$M(s)$ = is a math major
 $C(s)$ = is a computer science student
 $E(s)$ = is an engineering student

a. There is an engineering student who is a math major.

$\exists s \in D$ such that $E(s) \wedge M(s)$

b. Every computer science student is an engineering student.

$\forall s \in D$, if $C(s)$ then $E(s)$

c. No computer science students are engineering students.

$\forall s \in D$, $C(s) \wedge \neg E(s)$

d. Some computer science students are also math majors.

$\exists s \in D$ such that $C(s) \wedge M(s)$

e. Some computer science students are engineering students and some are not.

$\exists s \in D$ such that $C(s) \wedge E(s)$ and $C(s) \wedge \neg E(s)$

3.2

2. Which of the following is a negation for "All dogs are loyal"? More than one answer may be correct.

$L(d)$ = loyal

(All dogs are loyal)
 $\forall d \in D, L(s)$

Negation
 $\exists d \in D$ such that $\neg L(s)$

a. All dogs are disloyal.

$\forall d \in D, \neg L(s)$

NO

b. No dogs are loyal.

$\neg \forall d \in D, L(s)$

NO

c. Some dogs are disloyal.

$\exists d \in D, \neg L(s)$

c. Some dogs are disloyal.

$\exists d \in D$ such that $\neg L(s)$ YES

d. Some dogs are loyal.

$\exists d \in D$ such that $L(s)$ NO

c, f

e. There is a disloyal animal that is not a dog.

$\neg \exists d \in A$ such that $\neg L(s)$ NO

f. There is a dog that is disloyal.

$\exists d \in D$ such that $\neg L(s)$ YES

g. No animals that are not dogs are loyal.

$\neg \forall d \in D, L(s)$ NO

h. Some animals that are not dogs are loyal.

$\neg \exists d \in D$ such that $L(s)$ NO

4. Write an informal negation for each of the following statements. Be careful to avoid negations that are ambiguous.

a. All dogs are friendly.

$\forall d \in D, d$ are friendly

Neg. $\exists d \in D$ such that d are not friendly.

There are some dogs who are not friendly.

b. All people are happy.

$\forall p \in D, p$ are happy.

Neg. $\exists p \in D$ such that are not happy.

There are some people who are not happy.

c. Some suspicions were substantiated.

$\exists s \in D$ such that s were substantiated

Neg. $\forall s \in D, s$ not substantiated.

All suspicions were not substantiated.

d. Some estimates are accurate.

$\exists e \in D$ such that e are accurate

Neg. $\forall e \in D, e$ not accurate

All estimates are not accurate.