

2:

a: Original: All real numbers are integers.

Quantifier:  $\forall$  (All)

Subject: Real Number ( $x$ )

Predicate: Integer

$\forall x$ , a real number,  $x$  is an integer

$\exists x$ , a real number,  $x$  is not an integer.

Negation: Some real numbers are not integers.

b: Original: There are positive integers less than or equal to  $\sqrt{11}$ .

Quantifier:  $\exists$  (There are)

Subject: Positive integer ( $x$ )

Predicate: Less than or equal to  $\sqrt{11}$  ( $x \leq \sqrt{11}$ )

$\exists x$ , a positive integer,  $x \leq \sqrt{11}$

$\forall x$ , a positive integer,  $x > \sqrt{11}$

Negation: All positive integers are greater than  $\sqrt{11}$ .

c: Original: Every integer is divisible by 1 and divisible by 7.

Quantifier:  $\forall$  (Every)

Subject: Integer ( $x$ )

Predicate: Divisible by 1 and divisible by 7

$\forall x$ , an integer,  $x$  is divisible by 1 and divisible by 7

$\exists x$ , an integer,  $x$  is not divisible by 1 or not divisible by 7.

Negation: Some integers are not divisible by 1 or not divisible by 7.

d: Original: Some even integers are divisible by 4.

Quantifier:  $\exists$  (some)

Subject: Even integer ( $x$ )

Predicate: Divisible by 4

$\exists x$ , an even integer,  $x$  is divisible by 4.

$\forall x$ , an even integer,  $x$  is not divisible by 4.

Negation: All even integers are not divisible by 4.

e: Original: For any real number  $x$ , if  $x$  is less than 0 then  $\sqrt{x}$  is not a real number.

Quantifier:  $\forall$  (For any)

Subject: Real number ( $x$ )

Predicate: If  $x < 0$  then  $\sqrt{x} \notin \mathbb{R}$

$\forall x$ , a real number,  $(x < 0) \rightarrow (\sqrt{x} \notin \mathbb{R})$

$\exists x$ , a real number,  $(x < 0) \wedge (\sqrt{x} \in \mathbb{R})$

Negation: There is at least one real number  $x$ , where  $x$  is less than 0, but  $\sqrt{x}$  is a real number.