# Section 1.3



## 1.

**b)** Let $x \in$ (All stones)
Let $P(x) = x$ is precious
Let $B(x) = x$ is beautiful
Symbolically, the statement is:
$(\forall x)(P(x) \Rightarrow \sim B(x))$

**c)** Let $x \in$ (All triangles).
Let $R(x) = x$ is a right triangle
Let $I(x) = x$ is an isosceles triangle
Symbolically, the statement is:
$(\exists x)(P(x) \wedge R(x))$

**d)** Note: Using definitions from part **c**
Symbolically, the statement is:
$(\forall x)(P(x) \Rightarrow \sim I(x))$

**e)** Note: Using definitions from part **c**
Symbolically, the statement is:
$(\forall x)(\sim I(x) \Rightarrow R(x))$

**f)** Let $x \in$ (All people)
Let $H(x) = x$ is honest.
Symbolically, the statement is:
$[(\forall x)(H(x))] \vee [(\forall x)(\sim H(x))]$

**g)** Note: Using definitions from part **f**
Let $y \in$ (All people)
Symbolically, the statement is:
$(\exists x)(H(x)) \wedge (\exists y)(\sim H(y))$

**h)** Let $x \in \mathbb{R}$
Symbolically, the statement is:
$(\forall x)(x \neq 0 \Rightarrow (x > 0 \vee x < 0))$

**j)** Let $x, y \in \mathbb{Z}$
Symbolically, the statement is:
$(\forall x)(\exists y)(x > y)$

**l)** Let $x, y \in \mathbb{Z}$, let $m \in \mathbb{R}$
Symbolically, the statement is:
$(\forall x)(\forall y)(\exists m)[(x \neq y) \Rightarrow (x > m > y) \vee (y > m > x)]$

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**o)** Let $x, y \in$ (All people)
Let $L(x, y) = x$ loves $y$
Symbolically, the statement is:
$(\forall x)(\exists y)(L(x, y))$

**p)** Let $x, y \in \mathbb{R}$
Symbolically, the statement is:
$(\forall x)(\exists! y)((x > 0) \Rightarrow (2^y = x))$

## 2.

**b)**

**c)**

**d)**

**e)**

**f)**

**g)**

**h)**

**j)**

**l)**

**o)**

**p)**

## 6.

**b)**

**c)**

**d)**

# Section 1.3

## 7.

a) ***Proof:***

b)

## 8.

a)

c)

d)

f)

g)

i)

j)

k)

l)

## 12.

b)

c)

d)

e)

f)

g)

h)