#### 1.4 Examples

1. 
$$\forall x (R(x) \rightarrow H(x))$$

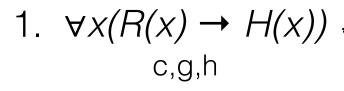
2. 
$$\forall x (R(x) \land H(x))$$

3. 
$$\exists x (R(x) \rightarrow H(x))$$

4. 
$$\exists x (R(x) \land H(x))$$

- a) Every animal is a rabbit and hops.
- b) There exists an animal such that if it is a rabbit, then it hops.
- c) Every rabbit hops.
- d) Some hopping animals are rabbits.
- e) There exists an animal that is a rabbit and hops.
- f) Some rabbits hop.
- g) If an animal is a rabbit, then that animal hops.
- h) All rabbits hop.

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- 2.  $\forall x (R(x) \land H(x))$
- 3.  $\exists x (R(x) \rightarrow H(x))$
- 4.  $\exists x (R(x) \land H(x))$

1. 
$$\forall x (R(x) \rightarrow H(x))$$
 c,g,h

2.  $\forall x (R(x) \land H(x))$ 

3.  $\exists x (R(x) \rightarrow H(x))$ 

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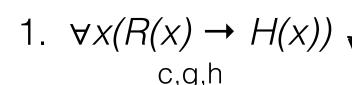
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 c,g,h

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2.  $\forall x (R(x) \land H(x))$ 

 $3. \exists x (R(x) \rightarrow H(x))$ 

4.  $\exists x (R(x) \land H(x))$ 

d,e,f

a) Every animal is a rabbit and hops.

b) There exists an animal such that if it is a rabbit, then it hops.

c) Every rabbit hops.

d) Some hopping animals are rabbits.

e) There exists an animal that is a rabbit and hops.

f) Some rabbits hop.

g) If an animal is a rabbit, then that animal hops.

h) All rabbits hop.

- A. Q(0)
- B. Q(-1)
- C. Q(1)
- D.  $\forall x Q(x)$
- E.  $\exists X Q(X)$
- F.  $\exists x \neg Q(x)$
- G.  $\forall x \neg Q(x)$

- A. Q(0) True  $0 \ge 0$
- B. Q(-1)
- C. Q(1)
- D.  $\forall x Q(x)$
- E.  $\exists X Q(X)$
- F.  $\exists x \neg Q(x)$
- G.  $\forall x \neg Q(x)$

A. 
$$Q(0)$$
 True  $0 \ge 0$ 

B. 
$$Q(-1)$$
 True  $-1 \ge -2$ 

C. 
$$Q(1)$$

D. 
$$\forall XQ(X)$$

E. 
$$\exists X Q(X)$$

F. 
$$\exists x \neg Q(x)$$

G. 
$$\forall x \neg Q(x)$$

A. 
$$Q(0)$$
 True  $0 \ge 0$ 

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$$Q(-1)$$
 True  $-1 \ge -2$ 

C. 
$$Q(1)$$
 False  $1 \ge 2$ 

D. 
$$\forall x Q(x)$$

E. 
$$\exists X Q(X)$$

F. 
$$\exists x \neg Q(x)$$

G. 
$$\forall x \neg Q(x)$$

A. 
$$Q(0)$$
 True  $0 \ge 0$ 

B. 
$$Q(-1)$$
 True  $-1 \ge -2$ 

C. 
$$Q(1)$$
 False  $1 \ge 2$ 

D. 
$$\forall x Q(x)$$
 False - C is a counterexample

E. 
$$\exists X Q(X)$$

F. 
$$\exists x \neg Q(x)$$

G. 
$$\forall x \neg Q(x)$$

A. 
$$Q(0)$$
 True  $0 \ge 0$ 

B. 
$$Q(-1)$$
 True  $-1 \ge -2$ 

C. 
$$Q(1)$$
 False  $1 \ge 2$ 

D.  $\forall x Q(x)$  False - C is a counterexample

E.  $\exists x Q(x)$  True - A&B are examples

F. 
$$\exists x \neg Q(x)$$

G.  $\forall x \neg Q(x)$ 

- A. Q(0) True  $0 \ge 0$
- B. Q(-1) True  $-1 \ge -2$
- C. Q(1) False  $1 \ge 2$
- D.  $\forall x Q(x)$  False C is a counterexample
- E.  $\exists x Q(x)$  True A&B are examples
- F.  $\exists x \neg Q(x)$  True C is an example
- G.  $\forall x \neg Q(x)$

- A. Q(0) True  $0 \ge 0$
- B. Q(-1) True  $-1 \ge -2$
- C. Q(1) False  $1 \ge 2$
- D.  $\forall x Q(x)$  False C is a counterexample
- E.  $\exists x Q(x)$  True A&B are examples
- F.  $\exists x \neg Q(x)$  True C is an example
- G.  $\forall x \neg Q(x)$  False A&B are counterexamples

- A. Q(0)
- B. *Q*(1)
- C. Q(2)
- D. Q(-1)
- E.  $\forall x Q(x)$
- F.  $\exists X Q(X)$

- A. Q(0) True 0 = 0
- B. Q(1)
- C. Q(2)
- D. Q(-1)
- E.  $\forall x Q(x)$
- F.  $\exists X Q(X)$

```
A. Q(0) True 0 = 0
```

B. 
$$Q(1)$$
 True  $1 = 1$ 

C. 
$$Q(2)$$

D. 
$$Q(-1)$$

E. 
$$\forall x Q(x)$$

F. 
$$\exists X Q(X)$$

```
A. Q(0) True 0 = 0
```

B. 
$$Q(1)$$
 True  $1 = 1$ 

C. 
$$Q(2)$$
 False  $2 = 16$ 

D. 
$$Q(-1)$$

E. 
$$\forall XQ(X)$$

F. 
$$\exists X Q(X)$$

```
A. Q(0) True 0 = 0
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B. 
$$Q(1)$$
 True  $1 = 1$ 

C. 
$$Q(2)$$
 False  $2 = 16$ 

D. 
$$Q(-1)$$
 False  $-1 = 1$ 

E. 
$$\forall x Q(x)$$

F. 
$$\exists X Q(X)$$

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A. Q(0) True 0 = 0
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$$Q(1)$$
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$$Q(2)$$
 False  $2 = 16$ 

D. 
$$Q(-1)$$
 False  $-1 = 1$ 

E. 
$$\forall x Q(x)$$
 False. C & D are counter examples

F. 
$$\exists X Q(X)$$

```
A. Q(0) True 0 = 0
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B. 
$$Q(1)$$
 True  $1 = 1$ 

C. 
$$Q(2)$$
 False  $2 = 16$ 

D. 
$$Q(-1)$$
 False  $-1 = 1$ 

E.  $\forall x Q(x)$  False. C & D are counter examples

F.  $\exists x Q(x)$  True. A and B are examples.