

## Semantic Problems: Existential Quantifiers, Models, and Validity

**A. Translate** the following English arguments into the formal language (using the translation key provided); then decide, for each of the models below, whether that model is a **validity counterexample** for the argument. (For each argument and model, say whether the premise is true or false in that model; and likewise with the conclusion.)

**G:** \_\_is legal

**H:** \_\_is resistible

### Argument 1:

1. Nothing legal is irresistible.  
\_\_\_\_\_

∴ If there's something irresistible  
then there's something illegal.

### Argument 2:

1. If there's something irresistible  
then there's something illegal.  
\_\_\_\_\_

∴ Nothing legal is irresistible.

### Model A

$\mathbb{D}$ : {**2**, **3**}

**a: 2   b: 3**

**G: {2, 3}   H: {2, 3}**

### Model B

$\mathbb{D}$ : {**2**, **3**}

**a: 2   b: 3**

**G: {2}   H: {2, 3}**

### Model C

$\mathbb{D}$ : {**2**, **3**}

**a: 2   b: 3**

**G: {2}   H: { }**

### Model D

$\mathbb{D}$ : {**2**, **3**}

**a: 2   b: 3**

**G: {2, 3}   H: {3}**

**B. Translate** the following two English arguments into the formal language (using the translation key provided); then decide, for each of the models from Problem (A), whether that model is a **validity counterexample** for the argument. (For each argument and model, say whether the premise is true or false in that model; and likewise with the conclusion.)

**G:** \_\_is legal

**H:** \_\_is resistible

**Argument 3:**

1. Nothing legal is irresistible.  
\_\_\_\_\_

∴ There's something irresistible  
if and only if there's something  
illegal.

**Argument 4:**

1. There's something irresistible  
if and only if there's something  
illegal.  
\_\_\_\_\_

∴ Nothing legal is irresistible.