Homework 4 Solutions

Due: Friday Oct. 8, by 11:59pm,
via Gradescope

- Failure to submit homework correctly will result in a zero on the homework.
- Homework must be in LaTeX. Submit the pdf file to Gradescope.
- Problems assigned from the textbook come from the 5th edition.
- No late homework accepted. Lateness due to technical issues will not be excused.

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1. (9 points) Section 3.4 # 30.
2. (18 points) Section 3.4 # 32, 34

When doing problems from section 3.4, please follow the following instructions.

(a) Rewrite each statement in *if-then* form.
(b) Sketch the diagram associated to each *if-then* statement.
(c) Reorder the statements in the premise so that the conclusion follows from Universal Transitivity.

3.4. #30

1. If an object is above all the triangles, then it is above all the blue objects.
2. If an object is not above all the gray objects, then it is not a square.
3. Every black object is a square.
4. Every object that is above all the gray objects is above all the triangles.

$\therefore$ If an object is black, then it is above all the blue objects.

1. $\forall$ object x, if x is above all the triangles, then x is above all the blue objects.
2. $\forall$ object x, if x is a square, then x is above all the gray objects.
3. $\forall$ object x, if x is black, then x is a square.
4. $\forall$ object x, if x is above all the gray objects, then x is above all the triangles.

$\therefore \forall$ object x, if x is black, then x is above all the blue objects.

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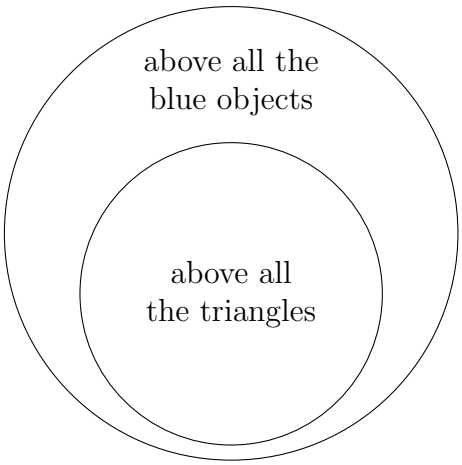

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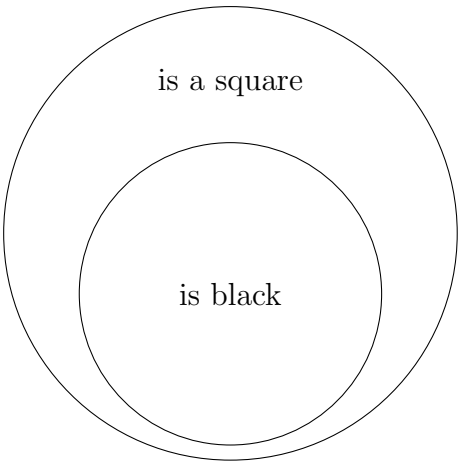

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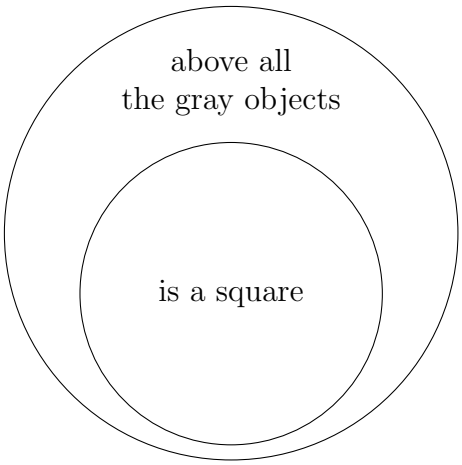

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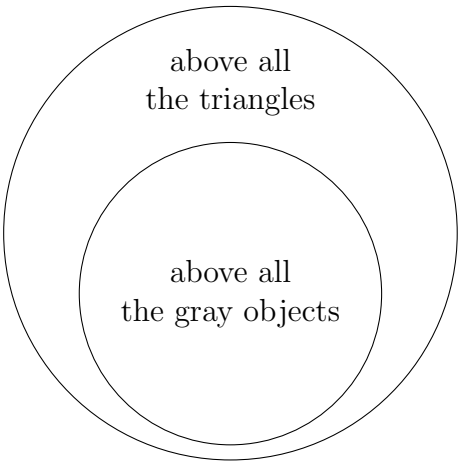


3. $\forall$ object x, if x is black, then x is a square.

2. $\forall$ object x, if x is a square, then x is above all the gray objects.

4. $\forall$ object x, if x is above all the gray objects, then x is above all the triangles.

1. $\forall$ object x, if x is above all the triangles, then x is above all the blue objects.

$\therefore \forall$ object x, if x is black, then x is above all the blue objects.

3.4. #32

1. When I work a logic example without grumbling, you may be sure it is one I understand.

2. The arguments in these examples are not arranged in regular order like the ones I am used to.

3. No easy examples make my head ache.

4. I can't understand examples if the arguments are not arranged in regular order like the ones I am used to.

5. I never grumble at an example unless it gives me a headache.

$\therefore$ These examples are not easy.

1. If I don't grumble then I can understand. So if I can't understand a logic example then I grumble at it.

2. The arguments in these examples are not arranged in regular order like the ones I am used to.

3. No easy examples make my head ache. If it is an easy example then it does not make my head ache. So if the example makes my head ache then it is not an easy example.

4. If the arguments are not arranged in regular order like the ones I am used to then I can't understand it.

5. I never grumble at an example unless it gives me a headache. I never grumble at an example if it does not give me a headache. I grumble at an example only if it gives me a headache. So if I grumble at an example it gives me a headache.

$\therefore$ These examples are not easy.

1. If I can't understand a logic example then I grumble at it.

2. The arguments in these examples are not arranged in regular order like the ones I am used to.

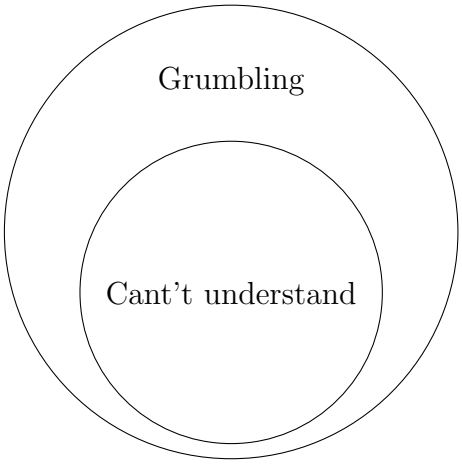
3. If the example makes my head ache then it is not an easy example.

4. If the arguments are not arranged in regular order like the ones I am used to then I can't understand it.

5. If I grumble at a logic example then it gives me a headache.

$\therefore$ These examples are not easy.

1.



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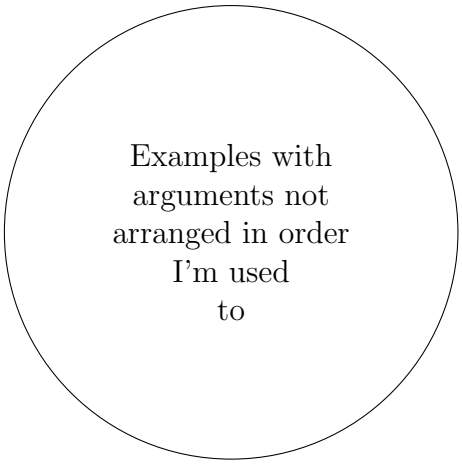

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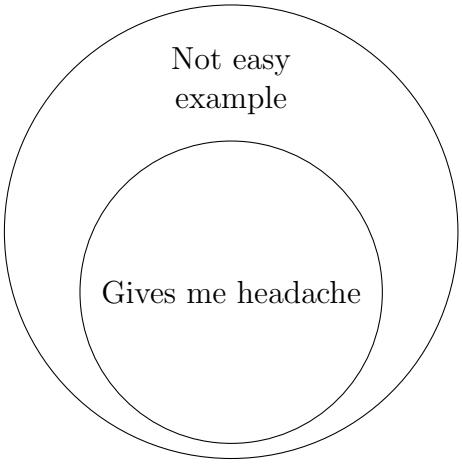

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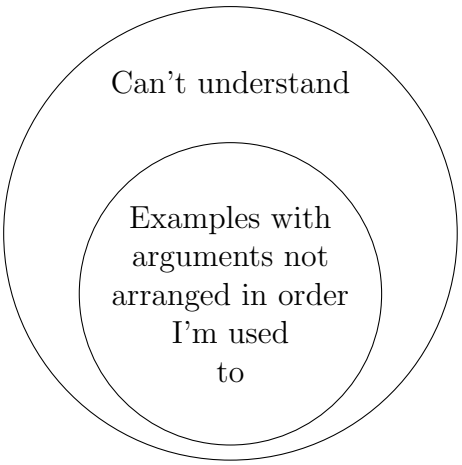

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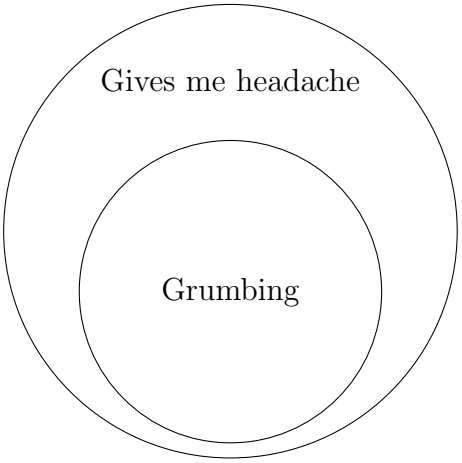


2. The arguments in these examples are not arranged in regular order like the ones I am used to.

4. If the arguments are not arranged in regular order like the ones I am used to then I can't

understand it.

1. If I can't understand a logic example then I grumble at it.

5. If I grumble at a logic example then it gives me a headache.

3. If the example makes my head ache then it is not an easy example.

$\therefore$ These examples are not easy.

For Problem #34, a single conclusion follows when all the given premises are taken into consideration, but it is difficult to see because the premises are jumbled up. reorder the premises to make it clear that a conclusion follows logically, and state the valid conclusion that can be drawn (It may be helpful to rewrite some of the statements in if-then form and to replace some statements by their contrapositives.)

3.4. #34

1. All writers who understand human nature are clever.
2. No one is a true poet unless he can stir the human heart.
3. Shakespeare wrote Hamlet.
4. No writer who does not understand human nature can stir the human heart.
5. None but a true poet could have written Hamlet.

1. All writers who understand human nature are clever. $\forall x$, if x understands human nature then x is clever.

2. No one is a true poet unless he can stir the human heart. $\forall x$, if x can not stir the human heart then x is not a true poet. $\forall x$, if x is a true poet then x can stir the human heart.

3. Shakespeare wrote Hamlet.

4. No writer who does not understand human nature can stir the human heart. Only writers who understand human nature can stir the human heart. A write can stir human heart only if he understands human nature. $\forall x$, if x can stir the human heart then x understands human nature.

5. None but a true poet could have written Hamlet. $\forall x$, if x can write Hamlet then x is a true poet.

1. $\forall x$, if x understands human nature then x is clever.

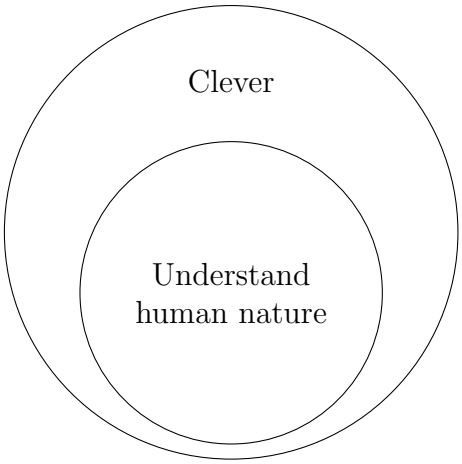
2. $\forall x$, if x is a true poet then x can stir the human heart.

3. Shakespeare wrote Hamlet.

4. $\forall x$, if x can stir the human heart then x understands human nature.

5. $\forall x$, if x can write Hamlet then x is a true poet.

1.



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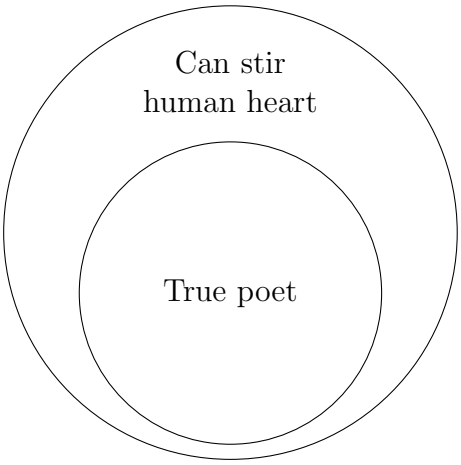
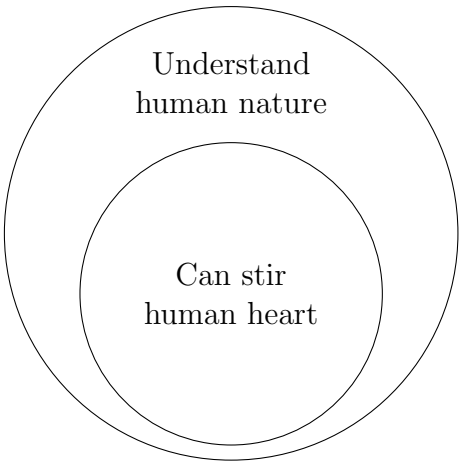


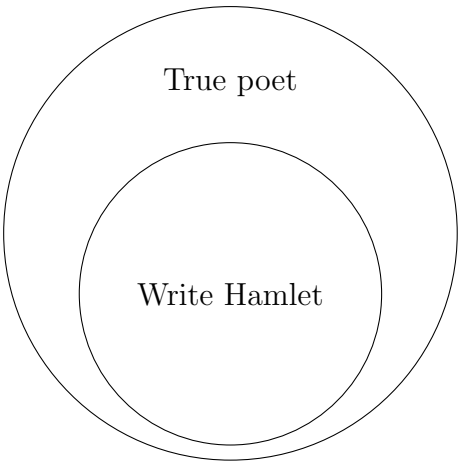
3.

Shakespeare wrote Hamlet.

4.


Understand
human nature
Can stir
human heart

5.


True poet
Write Hamlet

3. Shakespeare wrote Hamlet.

5. $\forall x$, if x can write Hamlet then x is a true poet.

2. $\forall x$, if x is a true poet then x can stir the human heart.

4. $\forall x$, if x can stir the human heart then x understands human nature.

1. $\forall x$, if x understands human nature then x is clever.

$\therefore$ Shakespeare is clever.