

## Feedback — Problem Set 4

[Help](#)

You submitted this homework on **Sun 26 Oct 2014 10:25 PM PDT**. You got a score of **27.00** out of **27.00**.

This problem set focuses on material covered in Week 4 (Lecture 6), so you should watch the lecture and attempt Assignment 6 before submitting your answers. The deadline for completing (and submitting) the problem set is Monday October 27 at 9:00AM US-PST. Note that you can save your entries as you work through the problems, and can change them at any time prior to submission, but once you submit your answers no further changes are possible. Note: A downloadable PDF file of this problem set is supplied as an asset to Lecture 6B.

### Question 1

Which of the following is equivalent to  $\neg\forall x[P(x) \Rightarrow (Q(x) \vee R(x))]$ ? (Only one is.) [5 points]

Your Answer	Score	Explanation
<input type="radio"/> $\exists x[P(x) \vee \neg Q(x) \vee \neg R(x)]$		
<input type="radio"/> $\exists x[\neg P(x) \wedge Q(x) \wedge R(x)]$		
<input checked="" type="radio"/> $\exists x[P(x) \wedge \neg Q(x) \wedge \neg R(x)]$	✓ 5.00	
<input type="radio"/> $\exists x[P(x) \wedge (\neg Q(x) \vee \neg R(x))]$		
<input type="radio"/> $\exists x[P(x) \vee (\neg Q(x) \wedge \neg R(x))]$		
Total	5.00 / 5.00	

### Question 2

Let  $p, q$  be variables denoting tennis players, let  $t$  be a variable denoting games of tennis, and let  $W(p, q, t)$  mean that  $p$  plays against  $q$  in game  $t$  and wins. Which of the following claims about tennis players mean the same as the symbolic formula  $\forall p \exists q \exists t W(p, q, t)$ ? Select all that have that meaning. [5 points]

Your Answer	Score	Explanation
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<input checked="" type="checkbox"/> Everyone wins a game.	✓	1.00
<input type="checkbox"/> Everyone loses a game.	✓	1.00
<input type="checkbox"/> For every player there is another player they beat all the time.	✓	1.00
<input type="checkbox"/> There is a player who loses every game.	✓	1.00
<input type="checkbox"/> There is a player who wins every game.	✓	1.00
Total		5.00 / 5.00

### Question 3

Let  $p, q$  be variables denoting the tennis players in a club, let  $t$  be a variable denoting the club's games of tennis, and let  $W(p, q, t)$  mean that  $p$  plays against  $q$  in game  $t$  and wins. Assuming that there are at least two tennis players and games between them do take place, which (if any) of the following symbolic formula cannot possibly be true? Select all you think cannot possibly be true. [3 points]

Your Answer		Score	Explanation
<input type="checkbox"/> $\forall p \exists q \exists t W(p, q, t)$	✓	1.00	
<input checked="" type="checkbox"/> $\forall p \forall q \exists t W(p, q, t)$	✓	1.00	
<input type="checkbox"/> $\forall q \exists p \exists t W(p, q, t)$	✓	1.00	
Total		3.00 / 3.00	

### Question 4

Which (one) of the following means "Everybody loves a lover", where  $L(x, y)$  means (person)  $x$  loves (person)  $y$  and a lover is defined to be someone in a mutual loving relationship? [5 points]  
If English is not your native language, you might want to discuss this sentence with a native English speaker before you answer. It's an idiomatic expression.]

Your Answer		Score	Explanation
<input checked="" type="radio"/> $\forall x \forall y [\exists z (L(x, z) \wedge L(z, x)) \Rightarrow L(y, x)]$	✓	5.00	

☐  $\forall x \forall y [\forall z (L(x, z) \vee L(z, x)) \Rightarrow L(y, x)]$

☐  $\forall x [\exists z (L(x, z) \wedge L(z, x)) \wedge \forall y L(y, x)]$

Total

5.00 / 5.00

## Question 5

Which of the following statements about the order relation on the real line is/are false? [4 points]

Your Answer	Score	Explanation
<input type="checkbox"/> $\forall x \forall y \forall z [(x \leq y) \wedge (y \leq z) \Rightarrow (x \leq z)]$	✓ 1.00	
<input type="checkbox"/> $\forall x \forall y [(x \leq y) \wedge (y \leq x) \Rightarrow (x = y)]$	✓ 1.00	
<input type="checkbox"/> $\forall x \exists y [(x \leq y) \wedge (y \leq x)]$	✓ 1.00	
<input checked="" type="checkbox"/> $\exists x \forall y [(y < x) \vee (x < y)]$	✓ 1.00	
Total	4.00 / 4.00	

## Question 6

A student produced [this purported proof](#) while trying to understand Euclid's proof of the infinitude of the primes. Grade it according to the [course rubric](#). Enter your grade (which should be a whole number between 0 and 24, inclusive) in the box. You should come within 4 points of the instructor's grade for full marks [5 points], within 6 points for partial marks [3 points].

**You should read the website section "Using the rubric" (it includes a short explanatory video) before attempting this question.**

You entered:

20

Your Answer      Score      Explanation

20      ✓ 5.00      Fair grade. The argument is mathematically correct and well laid out. There is a technical issue that means it won't get top marks, but I think

it is worth 19. SEE THE TUTORIAL VIDEO.

Total	5.00 /
	5.00