

Feedback — Problem Set 5

[Help](#)

You submitted this homework on **Sat 1 Nov 2014 12:27 PM PDT**. You got a score of **18.00** out of **22.00**.

This problem set focuses in part on material covered in Week 5 (Lecture 7), so I recommend you to watch the lecture and attempt Assignment 7 before submitting your answers. The remainder of this problem set is revision material. The deadline for completing (and submitting) the problem set is Monday November 3 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 7B.

Question 1

Let m, n denote any two natural numbers. Is the following a valid proof that mn is odd iff m and n are odd? [3 points]

If m, n are odd there are integers p, q such that $m = 2p + 1, n = 2q + 1$. Then $mn = (2p + 1)(2q + 1) = 2(2pq + p + q) + 1$, so mn is odd. That completes the proof.

Your Answer	Score	Explanation
<input type="radio"/> Valid		
<input checked="" type="radio"/> Invalid	✓ 3.00	This proves just one of the required two implications.
Total	3.00 / 3.00	

Question 2

Take the sentence:

You can fool some of the people some of the time, but you cannot fool all of the people all the time.

Let x be a variable for a person, t a variable for a period of time, and let $F(x, t)$ mean you can fool x at time t . Which of the following mathematical formulas is equivalent to the given

statement? [4 points]

Your Answer	Score	Explanation
<input checked="" type="radio"/> $\exists x \exists t F(x, t) \wedge \exists x \exists t \neg F(x, t)$	✓ 4.00	
<input type="radio"/> $\exists x \exists t F(x, t) \wedge \neg \forall x \exists t F(x, t)$		
<input type="radio"/> $\exists x \exists t F(x, t) \wedge \neg \exists x \exists t F(x, t)$		
<input type="radio"/> None of the above.		
Total	4.00 / 4.00	

Question 3

True or false? For any two statements ϕ and ψ , either $\phi \Rightarrow \psi$ or its converse is true (or both). [2 points]

Your Answer	Score	Explanation
<input type="radio"/> True		
<input checked="" type="radio"/> False	✗ 0.00	If you work out the truth tables for the two formulas you will find that one is always T.
Total	0.00 / 2.00	

Question 4

Are the following two statements equivalent? [2 points]

$\neg(\phi \Rightarrow \psi)$ and $\phi \wedge (\neg\psi)$


Your Answer	Score	Explanation
<input checked="" type="radio"/> Yes.	✓ 2.00	
<input type="radio"/> No.		
Total	2.00 / 2.00	

Question 5

Are the following two statements equivalent? [3 points]

$(\phi \vee \psi) \Rightarrow \theta$ and $(\phi \Rightarrow \theta) \wedge (\psi \Rightarrow \theta)$

Your Answer	Score	Explanation
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<input checked="" type="radio"/> Yes. 	3.00	You can prove this two ways. Either show they have the same truth table or provide a logical argument to establish equivalence.
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<input type="radio"/> No.		
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Total	3.00 / 3.00	
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Question 6

True or false? There are infinitely many natural numbers n for which \sqrt{n} is rational. (Before entering your answer, you should construct a proof of the statement or its negation, so you are sure.) [3 points]

Your Answer	Score	Explanation
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<input checked="" type="radio"/> True 	3.00	Perhaps the simplest proof is to observe that $\sqrt{k^2}$ is rational (in fact is an integer) for every natural number k .
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<input type="radio"/> False		
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Total	3.00 / 3.00	
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Question 7

[This argument](#) is a proof that $1=2$. Obviously it is incorrect. Identify exactly what the error is, and grade the purported proof according to the [course rubric](#).

Remember, this is not a regular mathematics course of the kind you are probably familiar with. We are working on various elements of mathematical thinking, mathematical exposition, and the communication of mathematics. The rubric is designed to focus attention on all of those factors. Your "Overall valuation" figure is the grade you would assign a student if s/he submitted this proof in a first-year college *mathematics* course.

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:

10

Your Answer	Score	Explanation
10	✓ 3.00	A bit low. Yes, the logic is badly flawed, but the overall proof structure is good. I gave it 16 marks. SEE THE TUTORIAL VIDEO.
Total	3.00 / 5.00	