Feedback — Problem Set 7

Help

You submitted this homework on **Mon 17 Nov 2014 6:43 AM PST**. You got a score of **21.00** out of **26.00**.

This problem set focuses on material covered in Week 7 (Lecture 9), so I recommend you to watch the lecture and attempt Assignment 9 before submitting your answers. The deadline for completing (and submitting) the problem set is Monday November 17 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 9B.

Question 1

Say which of the following statements are true. (Leave the box blank to indicate that it is false.) [5 points]

Your Answer		Score	Explanation
☑ $20 \mid 300$	✔	1.00	
☐ $17 \mid 35$	✔	1.00	
☑ $5 \mid 0$	✔	1.00	
☐ $0 \mid 5$	✔	1.00	
☑ $21 \mid (-21)$	✔	1.00	
Total		5.00 / 5.00	

Question 2

Say whether the following proof is valid or not. [3 points]

Theorem. The square of any odd number is 1 more than a multiple of 8. (For example, $3^2 = 9 = 8 + 1, 5^2 = 25 = 3 \cdot 8 + 1$)

Proof: By the Division Theorem, any number can be expressed in one of the forms

$4q,\ 4q+1,\ 4q+2,\ 4q+3$ So any odd number has one of the forms $4q+1, 4q+3$

Squaring each of these gives:

$$\begin{aligned}(4q+1)^2 &= 16q^2+8q+1 &= 8(2q^2+q)+1\\(4q+3)^2 &= 16q^2+24q+9 &= 8(2q^2+3q+1)+1\end{aligned}$$

In both cases the result is one more than a multiple of 8. This proves the theorem.

Your Answer		Score	Explanation
Valid	✔	3.00	
Invalid			
Total		3.00 / 3.00	

Question 3

Say whether the following verification of the method of induction is valid or not. [3 points]

Proof: We have to prove that if:

* $A(1)$

* $(\forall n)[A(n) \Rightarrow A(n+1)]$

then $(\forall n)A(n)$

We argue by contradiction. Suppose the conclusion is false. Then there will be a natural number n such that $\neg A(n)$. Let m be the least such number. By the first condition, $m > 1$, so $m = n+1$ for some n. Since $n < m$, $A(n)$. Then by the second condition, $A(n+1)$, i.e., $A(m)$. This is a contradiction, and that proves the result.

Your Answer		Score	Explanation
Valid	✔	3.00	
Invalid			
Total		3.00 / 3.00	

Question 4

Evaluate this purported proof, and 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:

24

Your Answer		Score	Explanation
24	✔	5.00	Good grade. The proof is fine except for a missing citation of the application of the induction hypothesis. I gave it 22. SEE THE TUTORIAL VIDEO.
Total		5.00 / 5.00	

Question 5

Evaluate this purported proof, and 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 entered:

12

Your Answer		Score	Explanation
12	✔	5.00	Good grade. The theorem is false, but the argument has several merits. I gave it 16. SEE THE TUTORIAL VIDEO.
Total		5.00 / 5.00	

Question 6

Evaluate this purported proof, and 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 entered:

24

Your Answer		Score	Explanation
24	✖	0.00	Too high. Though the argument displays technical mathematical ability, it's not a proof. I gave it 10. SEE THE TUTORIAL VIDEO.
Total		0.00 / 5.00	