Problem Set 2

Due Monday, August 29

Problem 1. Find the mathematical error in the "proof"' shown below as you can and explain why the error is a problem. Rewrite the proof correcting the error and using good proof-writing technique.

Theorem 1. If a and b are odd integers, then a - b is even.

<i>Proof.</i> Let $a = 2k + 1$ and $b = 2k + 1$. Then $a - b = (2k + 1) - (2k + 1) = 0$. Since 0 is an	even
integer, the theorem holds.	
<i>Proof.</i> Here is where your proof/explanation goes!	
	••••
	.
	• • • •
	• • • •

.......

Dro	hl	ρm	Set	2
Pro	DI	еш	Set	~

Due	Monday	. August	29
Duc	Monday	, mugust	

Problem 2 . Let $a, b \in$	$\in \mathscr{U}_{\perp}$
-----------------------------------	---------------------------

1. Complete	e the following conditional statement so that if the hypothesis is true, so is the
conclusio	on:
If	then $a^2 + b^2$ is odd.
2. Prove the	completed statement from part (a).
<i>Proof.</i> Here is v	where your proof/explanation goes!

Pr	'n	h	lem	Set	2
	··	v.		-	_

Due Monday, August 29

Problem 3. Given the following proof, identify the theorem being proved. Write the theorem as a conditional statement.

Proof. Let *n* be an odd integer. Then n = 2k + 1 for some $k \in \mathbb{Z}$. Thus

$$3n-8 = 3(2k+1)-8$$

= $6k+3-8$
= $6k-5$
= $2(3k-3)+1$.

Therefore $3n-8$ is an odd integer.	
<i>Proof.</i> Here is where your proof/explanation goes!	
	• • • • • • • •
	• • • • • • • • • • • • • • • • • • • •
	• • • • • • • • • • • • • • • • • • • •

Problem Set 2

Due	Monda	y, Augu	ıst 29
-----	-------	---------	--------

Problem 4. Practice with conjecture: Suppose $f(x) = e^{3x}$ for $x \in \mathbb{R}$. Find the first 5 derivatives
of f . Identify the pattern and formulate a conjecture that appears to be true. Write you
conjecture in the form: If n is a natural number, then

<i>Proof.</i> Here is where your proof/explanation goes!	
	• • • • • • • • • • • • • • • • • • • •
	• • • • • • • • • • • • • • • • • • • •
••••••	
••••••	
••••••	•••••
•••••	• • • • • • • • • • • • • • • • • • • •

т.			•	^
Pro	hΙ	em	Set	2

Due Monday,	August	29
-------------	---------------	----

Problem 5. Your proof may only use the definitions of even and odd and basic facts about integers.

Theorem 2. If x is an even integer, then $3x^2 + 2x + 3$ is an odd integer.

<i>Proof.</i> Here is where your proof/explanation goes!	