CS 173,	Fal	1	201	6
Examlet	2,	F	Part	\mathbf{B}

FIRST:

LAST:

Discussion: Thursday 2 3 4 5 Friday 9 10 11 12 1 2

1. (5 points) Let a and b be integers, b > 0. We used two formulas to define the quotient q and the remainder r of a divided by b. One of these is a = bq + r. What is the other?

Solution: $0 \le r < b$

2. (6 points) Use the Euclidean algorithm to compute gcd(7839, 1474). Show your work.

Solution:

$$7839 - 5 \times 1474 = 7839 - 7370 = 469$$

$$1474 - 3 \times 469 = 1474 - 1407 = 67$$

$$469 - 7 \times 67 = 0$$

So the GCD is 67.

3. (4 points) Check the (single) box that best characterizes each item.

$$-7 \equiv 13 \pmod{5}$$

true



false

$$\gcd(p,q) = \frac{pq}{\operatorname{lcm}(p,q)}$$
(p and q positive integers)

always



sometimes

never

CS 173, Fall 2016 Examlet 2, Part B	NETID:					
FIRST:		LAST:				
Discussion: Thursday	2 3 4	5 Friday 9 10	11	12	1	2
 (5 points) Is the following clair showing that it is not. There is an integer n such 		ally explain why it is false, nod 6) and $n \equiv 1 \pmod{9}$		a conci	rete e	xampl
Solution: There is no such $n = 1 + 9j$, where k and j are impossible because the right signal.	integers. So 2 -	_	s that 1			
2. (6 points) Use the Euclidean a Solution: $1702 - 1221 = 481$ $1221 - 481 \times 2 = 1221 - 962 = 481 - 259 = 222$		mpute gcd(1702, 1221). Sh	now you:	r work		
259 - 222 = 37 $222 - 6 \times 37 = 0$ So $gcd(1702, 1221) = 37$						
3. (4 points) Check the (single) b	ov that heet ch	aracterizes each item				

false

 ${\rm true}$

 $25 \equiv 4 \pmod{7}$

CS 173, Fa		NE	TI	D:								
FIRST:	LA	ST:										
Discussion:	Thursday	2	3	4	5	Friday	9	10	11	12	1	2
1. (5 points) Is t example showing	he following claing that it is not.	m trı	ue?	Inforn	nally	explain wh	ny it	is, or	give a	a concr	ete c	ounter-
Claim: Fo	r all non-zero int	egers	a ar	d b,	if $a \mid$	b and $b \mid a$,	then	a = 0	b.			
Solution: Th	is is false. Consi	$\operatorname{der} a$	= 3	and b	o = -	3. Then $a \mid$	b an	$d b \mid a$	a, but	$a \neq b$.		
2. (6 points) Use Solution: $1224 - 5 \times 221$ 221 - 119 = 10 119 - 102 = 17 $102 - 17 \times 6 =$ So the GCD is	= 1224 - 1105 = 2 0		hm t	o con	npute	gcd(221, 1	224).	Show	v your	work.		
v -	ek the (single) be the example integers p and q , then p and q are	q,				rizes each i	item. $\sqrt{}$	fal	se			

false

 $-7 \mid 0$ true $\boxed{\checkmark}$

CS 173, Fall 2016 Examlet 2, Part B	NET	ID:							
FIRST:			LA	AST:					
Discussion: Thursday	2	3 4	5	Friday 9	10	11	12	1	2
1. (5 points) Is the following claim showing that it is not.	m true? l	Informa	ılly ex	eplain why it	is false, o	r give	a concı	rete e:	xample
There is an integer n such	n that n	$\equiv 2 \text{ (m)}$	od 6)	and $n \equiv 5$ (a	mod 15)?	2			
Solution: This is true. Cons	ider n =	20. 20	$\equiv 2$ ((mod 6) and 2	$20 \equiv 5 \text{ (r}$	nod 15	5).		
2. (6 points) Use the Euclidean	algorithn	n to cor	$nput\epsilon$	$\gcd(221, 122)$	4). Show	your	work.		
Solution:					•				
$1224 - 5 \times 221 = 1224 - 1105$	= 119								
221 - 119 = 102									
119 - 102 = 17									
$102 - 17 \times 6 = 0$									
So the GCD is 17.									
3. (4 points) Check the (single) b	ox that	best cha	aracte	erizes each ite	em.				
If a and b are positive and $r = \text{remainder}(a, b)$, then $\gcd(a, b) = \gcd(r, a)$			true		false	/			
$7 \equiv -7 \pmod{k}$	always	s	s	ometimes	<u>√</u>	never			

 $\mathbf{2}$

CS 173,	Fal	11	201	6
Examlet	2,	F	Part	\mathbf{B}

NETID:		

FIRST:

LAST:

Discussion: Thursday 2 3 4 5 Friday 9 10 11 12 1

1. (5 points) Is the following claim true? Informally explain why it is, or give a concrete counter-example showing that it is not.

For any positive integers a, b, and c, if $a \mid c$ and $b \mid c$, then $ab \mid c$

Solution: This is not true. Consider a = b = c = 5. Then $a \mid c$ and $b \mid c$. But ab = 25 and c = 5. So ab does not divide c.

2. (6 points) Use the Euclidean algorithm to compute gcd(535, 1819). Show your work.

Solution:

$$535 - 0 \times 1819 = 535$$

$$1819 - 3 \times 535 = 1819 - 1605 = 214$$

$$535 - 2 \times 214 = 535 - 428 = 107$$

$$214 - 2 \times 107 = 0$$

So the GCD is 107.

3. (4 points) Check the (single) box that best characterizes each item.

If a and b are positive and r = remainder(a, b), then gcd(b, r) = gcd(r, a)

true

false $\sqrt{}$

 $-7 \equiv 13 \pmod{5}$

true

 $\sqrt{}$

false

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FIRS		LAST:											
Discus	ssion:	Thursday	2	3	4	5	Fric	day 9	10	11	12	1	2
` -	,	the following claing that it is not.		ue?	Infor	mally	explai	n why	it is, or	give a	a concr	ete c	ounter-
	Claim: For $ccd(a, c)$	or all positive int > 1 .	egers	a, b,	and	c, if g	$\gcd(a,b)$	(c) > 1,	then go	$\operatorname{ed}(a,b)$	> 1 ar	nd	
	ion: T $c) = 1.$	his is false. Cons	ider (a = b	0 = 3	and a	c=2.	Then b	c=6.	So gcd	(a,bc)	= 3 3	> 1 but
2. (6 poi	nts) Use	e the Euclidean a	lgorit	hm t	o cor	npute	e gcd(2	385,636	6). Show	w your	work.		
Solut	ion:												
2385 -	-3×636	6 = 2385 - 1908 =	= 477										
636 -	477 = 1	59											
477 -	3×159	=0											
So the	e GCD is	s 159.											
3. (4 poi	nts) Che	eck the (single) be	ox tha	at be	st cha	aracte	erizes e	ach ite	n.				
		are positive $gcd(pq, qk) =$	q		$p_{\dot{q}}$	П		pqk		$q \gcd(p$	(p,k)	$\sqrt{}$	

false $\sqrt{}$

true

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