CS 173, Sp Examlet 5,	•	5 N	ETII	D:						
FIRST:					LAST	`:				
Discussion:	Monday	9	10	11	12	1	2	3	4	5
1. (5 points) How word 'massa				_		made	be 1	rearra	angin	g the characters in the
9 (10 · · · · ) Cl	1.11. (2.1.)	1	.11	1			1			
2. (10 points) Che	ck the (single)	box t	tnat be	est cha	racterize	es eac	ch ite	em.		
Suppose a grap exactly 5 colors color appears of	s. By the pige	eonhol	le prin			trı	ue		fa	alse
$f: \mathbb{N} \to \mathbb{R}, \ f(x)$	$(x) = x^2 + 2$		onto not a	valid f	function			no	t ont	0
$f: \mathbb{N}^2 \to \mathbb{N}, \ f(g)$	(p,q) = pq		onto not a	valid f	function			no	t ont	о 📗
$g: \mathbb{R}^2 \to \mathbb{R}^2, g($	(x,y) = (y,3x)		one-to-		function			no	t one	e-to-one

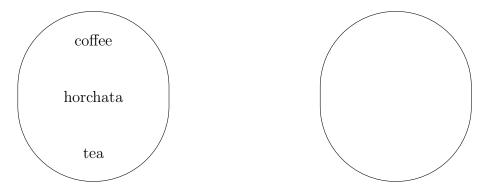
false

true

 $\exists y \in \mathbb{Z}, \ \forall x \in \mathbb{Z}, \ y \leq x$ 

CS 173, Sp Examlet 5	oring 2015 , Part B	5 N	ETII	):									
FIRST:					LAS	Γ:							
Discussion:	Monday	9	10	11	12	1	2	3	4	5			
1. (5 points) Com	plete this pictu	re to	make	an exa	ample o	f a fu	nctio	n tha	t is o	ne-to-	one b	ut not	onto

1. (5 points) Complete this picture to make an example of a function that is one-to-one but not onto, by adding elements to the co-domain and arrows showing how input values map to output values. The elements of the co-domain must be integers.



2. (10 points) Check the (single) box that best characterizes each item.

If a function from $\mathbb{R}$ to $\mathbb{R}$ is increas it must be one-to-one.	false false
$f: \mathbb{Z} \to \mathbb{Z}, f(x) = x + 3 \text{ if } x \text{ is even}$ and $f(x) = x - 22 \text{ if } x \text{ is odd}$	not a valid function not onto
$g: \mathbb{Z} \to \mathbb{Z}, \ g(x) = 7 - \left\lfloor \frac{x}{3} \right\rfloor$	onto not onto not a valid function
$g: \mathbb{Z} \to \mathbb{Z}, \ g(x) =  x $	one-to-one not one-to-one not a valid function
$\exists y \in \mathbb{N}, \ \forall x \in \mathbb{N}, \ x = xy$	true false

CS 173, Sp Examlet 5		NETID:				
FIRST:						
Discussion:	Monday	9 10 1	$egin{array}{cccccccccccccccccccccccccccccccccccc$	1 2	3 4 5	
1. (5 points) Suppare there from		p and $ B  = q$ .	How many	different	functions	
2. (10 points) Che	eck the (single)	box that best	characterize	s each ite	m.	
exactly 5 color	oh with 12 vertices. By the pige on at least two v	onhole princip		true	false	
$f: \mathbb{N} \to \mathbb{R}, \ f(x)$	$x) = x^2 + 2$	onto not a val	lid function		not onto	
$f: \mathbb{N}^2 \to \mathbb{N}, \ f($	(p,q) = pq	onto not a val	lid function		not onto	
$g: \mathbb{R}^2 \to \mathbb{R}^2, g$	(x,y) = (y,3x)	one-to-or not a val	ne lid function		not one-to-o	one

false

true

 $\exists y \in \mathbb{Z}, \ \forall x \in \mathbb{Z}, \ y \leq x$ 

CS 173, S <sub>l</sub> Examlet 5		NE	TID:									
FIRST:		LAST:										
Discussion:	Monday	9	<b>10</b> 1	11	12	1	2	3	4	5		
1. (5 points) How word ''minin	many different			_	can be	made	e be 1	rearra	angin	g the cl	naracter	rs in th
2. (10 points) Ch	eck the (single) h	oox th	at best	chi	aracteriz	es ea	ich ite	em				
If $f: \mathbb{Z} \to \mathbb{R}$ is	a function such a the set of all ev	that		the	domain image o	of $f$			the	co-don	nain of .	f
$g: \mathbb{Z} \to \mathbb{N}, \ g(x)$	=  x		onto not a va	alid	function	n _		no	t ont	о 🗌		
$f: \mathbb{N} \to \mathbb{N}, f(x)$	(x) = 3 - x		one-to-c not a va		function	1		no	t one	-to-one		
$f: \mathbb{Z} \to \mathbb{Z}, f(x)$ and $f(x) = x$	(x) = x + 3  if  x  is  x + 22  if  x  is odd	even,			e-to-one t a valid	func	ction			not on	e-to-one	е 🗌

true

false

 $\exists y \in \mathbb{R}^+, \ \forall x \in \mathbb{R}^+, \ xy = 1$  (\mathbb{R}^+ \text{ is the positive real numbers.})

CS 173, Sp Examlet 5		NETID:							
FIRST:		LAS	Γ:						
Discussion:	Monday	9 10 11	12	1	2	3	4	5	
1. (5 points) Support there from A to		p and $ B  = q$ , $q$	$p \leq q$ . H	low ma	ny di	fferen	nt one	e-to-or	ne functions a
2. (10 points) Che	eck the (single)	box that best ch	ıaracteriz	zes eacl	h iten	n.			
	nto if and only me as its co-dor	tmin		false					
$f: \mathbb{Z} \to \mathbb{R}, \ f(x)$	x) = x	one-to-one not a valid		n		not	one-t	o-one	
$g: \mathbb{Z} \to \mathbb{Z}, \ g(x)$	$)=7-\left\lfloor \frac{x}{3} ight floor$	one-to-one not a valid		n		not	one-t	o-one	
$f: \mathbb{N}^2 \to \mathbb{Z}, \ f($	$(p,q) = 2^p 3^q$	onto not a valid	l functio	n		not	onto		

true

false

 $\forall x \in \mathbb{Z}, \ \exists y \in \mathbb{Z}, \ x \neq y \text{ and } x + y = 0$ 

CS 173, Sp Examlet 5,	oring 2015 , Part B	5 N	ETII	D:								
FIRST:					LAS	Γ:						
Discussion:	Monday	9	10	11	12	1	2	3	4	5		

1. (5 points) Suppose that |A|=p, |B|=q, |C|=n. How many different functions are there from A to  $B\times C$ ?

2. (10 points) Check the (single) box that best characterizes each item.

If $f: A \to B$ is onto, then	$ A  \ge  B  \qquad  A $	$\leq  B $	A  =  B
$f: \mathbb{R} \to \mathbb{Z}, \ f(x) = x$	one-to-one not a valid function		not one-to-one
$g: \mathbb{N} \to \mathbb{Z}, \ g(x) = x^2$	one-to-one not a valid function		not one-to-one
$g: \mathbb{Z} \to \mathbb{N}, \ g(x) = x$	onto not a valid function		not onto
$\forall x \in \mathbb{R}^+, \ \exists y \in \mathbb{R}^+, \ xy = 1$ (\mathbb{R}^+  is the positive real numbers.)	true	false	