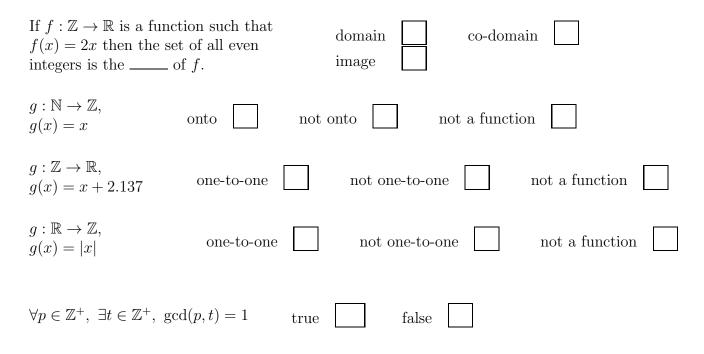
CS 173, Fa Examlet 5,		NI	ETI	D:								
FIRST:						AST:						
Discussion:	Thursday	2	3	4	5	Friday	9	10	11	12	1	2

1. (5 points) The departmental proctor needs to arrange 9 students in a row of 9 chairs for a makeup exam. 4 of these students are from CS 173 and cannot sit next to one another. How many options does the proctor have?

If a function from \mathbb{R} to it must be one-to-one.	o \mathbb{R} is increasi	ing, tru	ie		false		
$g: \mathbb{N} \to \mathbb{N}, \\ g(x) = x$	onto	not c	onto]	not a funct	ion	
$g : \mathbb{R}^2 \to \mathbb{R}^2, g(x, y) = (y, 3x)$	one-to-one		not one-	to-one	e	not a function	
$g: \mathbb{N} \to \mathbb{Z}, \\ g(x) = x^2$	one-to-one		not one-	to-one		not a function	
$\exists y \in \mathbb{R}, \ \forall x \in \mathbb{R}, \ xy =$	1	true		false			

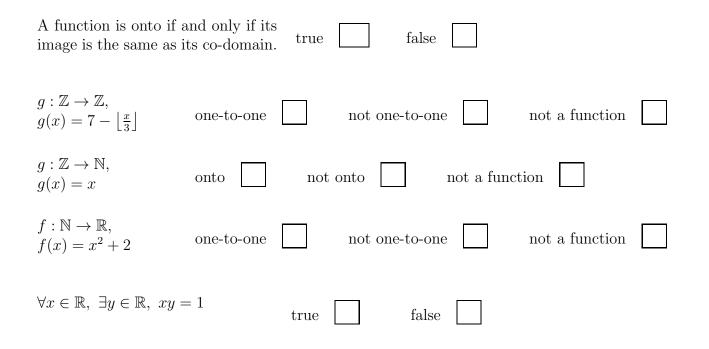
CS 173, Fall 2015 Examlet 5, Part B			ETI	D:								
FIRST:						AST:						
Discussion:	Thursday	2	3	4	5	Friday	9	10	11	12	1	2

1. (5 points) How many different 13-letter strings ending with s can be made be rearranging the characters in the word **'massachusetts'**? Show your work.



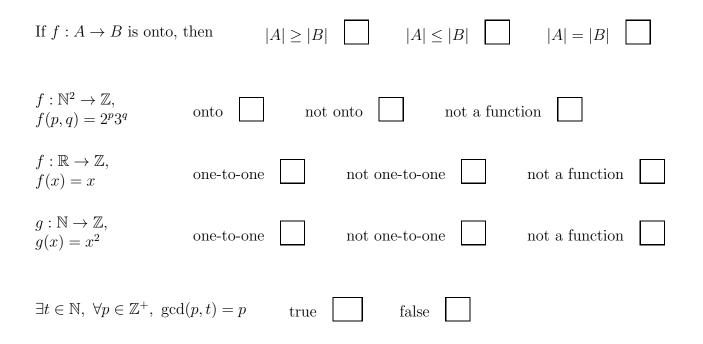
CS 173, Fa Examlet 5		Nł	ETI	D:								
FIRST:					$\mathbf{L}_{\mathbf{z}}$	AST:						
Discussion:	Thursday	2	3	4	5	Friday	9	10	11	12	1	2

1. (5 points) Hermione Granger has 7000 socks in her magically expanding drawer. The socks are colored purple, magenta, shocking pink, and neon green. How many socks must she pull out of the drawer before she is guaranteed to have two socks of the same color. Briefly justify your answer.



CS 173, Fa Examlet 5,		NF	ETI	D:]			
FIRST:					$\mathbf{L}_{\mathbf{z}}$	AST:						
Discussion:	Thursday	2	3	4	5	Friday	9	10	11	12	1	2

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



CS 173, Fall 2015 Examlet 5, Part B			ETI	D:								
FIRST:						AST:						
Discussion:	Thursday	2	3	4	5	Friday	9	10	11	12	1	2

1. (5 points) Suppose that |A| = 3 and |B| = 2. How many onto functions are there from A to B? Briefly justify or show work.

$f: \mathbb{Z} \to \mathbb{Z},$ f(x) = x + 3 (x even), one-to-one not one-to-one not a function f(x) = x - 21 (x odd)
Suppose a graph with 12 vertices is colored with exactly 5 colors. By the pigeonhole principle, there is true false false a color that appear on at least two vertices.
$g: \mathbb{Z} \to \mathbb{Z},$ g(x) = x onto not onto not a function
$f: \mathbb{R} \to \mathbb{Z},$ f(x) = x one-to-one not a function
$\exists t \in \mathbb{Z}^+, \ \forall p \in \mathbb{Z}^+, \ \gcd(p, t) = 1 \qquad \text{false} \qquad \qquad$

CS 173, Fall 2015 Examlet 5, Part B			ETI	D:								
FIRST:						AST:						
Discussion:	Thursday	2	3	4	5	Friday	9	10	11	12	1	2

1. (5 points) Suppose that A is a set containing k+1 (distinct) integers. Use the Pigeonhole Principle to show that there are x and y in A ($x \neq y$) such that and x - y is a multiple of k.

