

CSE 280 Challenge Set 10

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Question 1

Solve for n in each of the following:

- $n \div 7 = 5, n \bmod 7 = 1$
- $n \div 6 = -6, n \bmod 6 = 2$
- $n \div 5 = 7, n \bmod 5 = 3$

Question 2

For the values of (x, y) below, determine if $x \equiv y \pmod{11}$:

- $(37, 12)$
- $(52, 19)$
- $(131, 10)$
- $(14, 13)$

Question 3

Find the GCD and LCM for the following values that are represented with non-decreasing prime factorization. Write your answers using non-decreasing prime factorization as well.

x	y	GCD	LCM
$2^4 \cdot 5^2$	$2^3 \cdot 3^2$		
$7^3 \cdot 13^2$	$2^5 \cdot 11 \cdot 13^3$		
$2^4 \cdot 3^2 \cdot 5 \cdot 7^2$	$3^2 \cdot 7^2$		

Question 4

Find the numbers in the set $S = \{-23, -13, -4, 4, 13, 23, 8, 15, 46\}$ that are part of the equivalence relation \mathbb{Z}_4 . In other words, find the numbers from S that are congruent $\pmod{4}$ and put them into the appropriate equivalence classes.

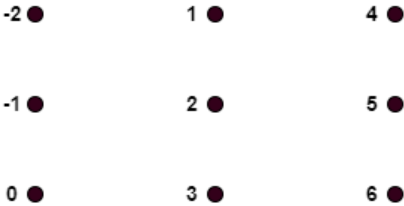
Equivalence Class	Partition Set
$[0]$	{ }
$[1]$	{ }
$[2]$	{ }
$[3]$	{ }

Question 5

Consider the following relation:

$$xR_y \text{ if } x \equiv y \pmod{3}$$

Complete the di-graph below to demonstrate that congruence is an equivalence relation. The domain of the relationship is \mathbb{Z} but the graph only includes a subset of these values.



Question 6

Use the following process with the table below:

- 1. Cross out the box with 1.
- 2. Goto the box with 2.
- 3. Let n equal the box you are on. Cross out all boxes that are multiples of n starting with n^2 .
- 4. Goto the smallest box greater than n that is not crossed out and go back to step three. If there are no more available numbers then stop.

Consider the numbers that are not crossed out. What do they represent?

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100