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Quiz VII

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20/20 :)

QUESTION 1. (10 points) Let $A = \{1,5,9,2,6,3,15,4,12,16,20\}$. Define "=" on A such that for all $a, b \in A$, $a" = "b$ if $(a \bmod 4) = (b \bmod 4)$. Then " = " is an equivalence relation.

(i) Find all distinct equivalence classes of " = ".

$\bar{1} = \{1,5,9\}$ $\bar{3} = \{3,15\}$

$\bar{2} = \{2,6\}$

$\bar{4} = \{4,12,16,20\}$

4 mod 4 = 12 mod 4 = 16 mod 4 = 20 mod 4

1 mod 4 = 5 mod 4 = 9 mod 4

2 mod 4 = 6 mod 4

3 mod 4 = 15 mod 4

(ii) if we view "=" as a subset of $A \times A$, how many elements does " = " have? Do NOT write the elements of " = ".

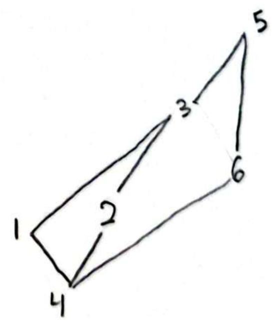
$|" = "| = 3^2 + 2^2 + 4^2 + 2^2$

$= 33$

QUESTION 2. (10 points) The following is a partial order relation on the set $A = \{1,2,3,4,5,6\}$

$" \le " = \{(1,1),(2,2),...,(6,6),(4,1),(4,2),(4,3),(4,5),(4,6),(2,3),(3,5),(2,5),(1,3),(1,5),(6,5)\}$

(i) Draw Hesse diagram of " ≤ ".



(ii) Find the minimum element of $(A, \le)$ and the maximum element of $(A, \le)$.

Minimum element = 4

Maximum element = 5