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Matkul: Matematika Diskrit - Quiz

1. **A.** Solve the Following System of Congruences:

$x \equiv 12 \pmod{25}$

$x \equiv 9 \pmod{26}$

$x \equiv 23 \pmod{27}$

Jawab:

$x \equiv 12 \pmod{25}$

$\rightarrow x = 12 + 25 k_1$

$x \equiv 9 \pmod{26}$

$\rightarrow 12 + 25 k_1 \equiv 9 \pmod{26}$

$\quad 25 k_1 \equiv -3 \pmod{26}$

$\quad 25 k_1 \equiv 23 \pmod{26}$

$25^{-1} \equiv 25 \pmod{26}$

$25 \cdot 25 k_1 \equiv 25 \cdot 23 \pmod{26}$

$\quad 625 k_1 \equiv 575 \pmod{26}$

$\quad k_1 \equiv 3 \pmod{26}$

$k_1 = 3 + 26 k_2$

$x = 12 + 25 k_1$

$\quad = 12 + 25 (3 + 26 k_2)$

$\quad = 12 + 75 + 650 k_2$

$\quad = 87 + 650 k_2$

$x \equiv 23 \pmod{27}$

$(87 + 650 k_2) \equiv 23 \pmod{27}$

$\quad 6 + 2 k_2 \equiv 23 \pmod{27}$

$\quad 2 k_2 \equiv 17 \pmod{27}$

$2^{-1} \equiv 14 \pmod{27}$

$14 \cdot 2 k_2 \equiv 14 \cdot 17 \pmod{27}$

$\quad 28 k_2 \equiv 238 \pmod{27}$

$\quad k_2 \equiv 22 \pmod{27}$

$k_2 = 22 + 27 k_3$

$x = 87 + 650 k_2$

$\quad = 87 + 650 (22 + 27 k_3)$

$\quad = 87 + 14300 + 17550 k_3$

$\quad = 14387 + 17550 k_3$

$x \equiv 14387 \pmod{17550}$

B $3125^{-1} \mod 9987$

$9987 = 3125(3) + 612$

$3125 = 612(5) + 65$

$612 = 65(9) + 27$

$65 = 27(2) + 11$

$21 = 11(2) + 5$

$11 = 5(2) + 1$

$612 = 9987 - 3125(3)$

$65 = 3125 - 612(5)$

$27 = 612 - 65(9)$

$11 = 65 - 27(2)$

$5 = 27 - 11(2)$

$1 = 11 - 5(2)$

$1 = 11 - 5(2)$

$= 11 - 2(27 - 11(2))$

$= 11(5) - 2(27)$

$= 5(65 - 27(2)) - 2(27)$

$= 5(65) - 12(27)$

$= 113(65) - 12(612)$

$= 113(3125) - 577(612)$

$= 1844(3125) - 577(9987)$

$1844(3125) = 1 \pmod{9987}$

$\rightarrow 3125^{-1} \mod 9987 = 1844$

C. $\gcd(9888, 6060)$

$9888 = 6060(1) + 3828$

$6060 = 3828(1) + 2232$

$3828 = 2232(1) + 1596$

$2232 = 1596(1) + 636$

$1596 = 636(2) + 324$

$636 = 324(1) + 312$

$324 = 312(1) + 12$

$312 = 12(26) + 0$

$\gcd(9888, 6060) = 12$

2. A = {A, B, C, D, E, F, G, H, I, J}

	A	B	C	D	E	F	G	H	I	J
A	1	1	0	1	0	0	1	1	0	
B	0	1	0	1	0	0	0	1	0	
C	1	0	1	0	0	0	0	0	0	
D	1	1	0	1	0	0	1	1	0	
E	1	0	1	0	1	0	1	0	0	
F	0	0	0	1	0	1	0	1	0	
G	1	1	0	1	1	0	1	0	0	
H	1	1	0	1	0	1	0	1	0	
I	0	0	1	0	1	0	1	0	1	
J	0	0	0	0	0	0	0	0	1	

B) R bersifat refleksi karena $(A,A), (B,B), (C,C)...(J,J)$ anggota relasi

B) R bersifat Simetri karena $(A,B), (B,A)...$ Semua pasangan terbalik anggota

B) R bersifat transitif karena $(A,B) (B,D)$ dan (A,D) anggota relasi.

3.
a) max element : $\{I, H\}$
b) min element : $\{a, b, c\}$
c) greatest element : —
d) least element : —

e) UB : $\{a, b, c\}$
f) LUB of $\{a, b, c\}$: $\{a, b\}$
g) LB of $\{f, g, h\}$: —
h) greatest bound of $\{f, g, h\}$: —

4. A) 1) x = integer
$\lceil x \rceil - \lfloor x \rfloor = x - x : 0$

2) x ≠ integer
misal $\lfloor x \rfloor = n, \ n < x < n+1$
$\lceil x \rceil = m, \ m-1 < x < m$
maka :
$(m-1) + (n-1) < x - x < m - n$
$m - n - 2 < 0 < m - n$

karena $\lceil x \rceil - \lfloor x \rfloor = $ integer, $\lceil x \rceil - \lfloor x \rfloor$
maka, $\lceil x \rceil - \lfloor x \rfloor : 0, x \notin \mathbb{Z}$
$0 \quad 1 \quad x \notin \mathbb{Z}$

$\lceil x \rceil - \lfloor x \rfloor$
$0 < \lceil x \rceil - \lfloor x \rfloor$
$0 < \lceil x \rceil - \lfloor x \rfloor < 2$

B. $F(x) = \lceil x \rceil + \lfloor x/2 \rfloor$