1. Solve each of the -following sets of simul-laneous congruences a) $x \equiv 1 \pmod{3}$, $x \equiv 2 \pmod{5}$, $x \equiv 3 \pmod{7}$ Product of all moduli, M= 3x5x7=105 We can compute partial moduli, dividing M by each modulus: $M_1 = \frac{105}{3} = 35$, $M_2 = \frac{105}{5} = 21$, $M_3 = \frac{105}{107} = 15$ Inverses of Mi mod mi where mi are 3,5,7. 1. 35 mod 3 = 2 = Universe of 31 mod 31+21 72/21 mod n=xp. (Linvense Loft 21 mod n= 1 3. 15 mod 7 = 1 inverse of off mod 7=1 Hotal weighted sum = (1)(35)(2) + (2).(1).(1)+(3).(5)() = 1=80 - 1 x0 x (18) bom L= = 70+42+45 (619) (91) + (11) (341) (12) (683) (9) = muc lotot $x = 157 \mod 105 \Rightarrow x = 52^{\circ} (\text{on, 1 remainder } 52)$ (大三 840以 mod 1080 mod 1070 mod 1070

(b) x= 5 (mod 11), x= 14 (mod 29), x= 15 (mod 31 Products of all moduli, M=11x29x31 Partial modelines M. Muboca No to fouter M1= 9889 100 M2= 19889 100 M3= 9889 =899 =341 : culto 31,9 NO09 Modulan invenses of Mi mod mi on yis. a. L' ens im me know, M: A: = 1 (mod mi) sessione 10 Mi mod mi= 899 mod 11 = 8 = 8 6000 78 1 L=260m8:以上到(mod 11)·8XZ=56点1户以图7 12. 7 347 mod 72902 22201 L= Thorn 71 (1). (15). (2). (2) 1 mod (29). 22xy = 88 = 1 = 42=4 3. 319 mod 31 = 9 9y3 = 1 mod (31) x9x7 = 63=1 = 43=7 Hotal sum = (5). (899). (2) + (4)(341) (4) + (15) (19) (2) x= 84056 mod 9889 => x=4944 on (8 nemainden 4944) : x = 4944 (mod 9889)

(2) $x = 5 \pmod{6}$, $x = 4 \pmod{11}$, $x = 3 \pmod{17}$ Solno Products of the moduli, M= mixm2 xm3 = 6x11x17 Pantial moduli: $M_1 = \frac{1122}{6}$, $M_2 = \frac{1122}{11}$, $M_3 = \frac{1122}{17}$ =66 - 187 Modular invenses: Mi. yi = 1 (mod (mi) 1. My mod 41 = 1 (mod 6) Mi mod mi = 187 mod 6=1 187 mod 41 1x4=1 (mod 6) 1x1=1=>41=1 2. 102 mod 11 = 3 3×4=12=1>42=4 3. 66 mod 17= 15 15×8=120=1=>43=8 total sum = (5) (187) (1)+(4) (102) (4)+(3) (66) (8) $X = 4151 \pmod{1122} \Rightarrow X = 785 \text{ on (3 remainder 785)}$ $X = 785 \pmod{1122}$