Chinese Remainder Theorem

Combine mod 11 and 29. Let a ESTAG .1 (a) Given that,

 $\chi = 1 \pmod{3}$, $\chi = 2 \pmod{5}$, $\chi = 3 \pmod{7}$

(i) combine mod 3 and 5.

1+3t=2 (mod 5)

() 3 3 = 1 (mod 5) = bom) (3) = 2 mid (1)

Since 3 = 2 (mod 5), t=2 2010+ 031 = 10101

50, x=1+3.2=7 (mod 15).

(1) combine n = 7 (mod 15) with n=3 (mod 7)

let, me 7+153, (10 hom) = 0 shown

7+158 = 3 (mod 7) =) 158 = -4=3 (mod 7)

But, 15=1 (mod 7) So, 5 = 3

Then n= 7+15.3=52 = 52

So, 2 = 52 (mod 105) (Ams)

() 2=5 (mod 11), 2 = 14 (mod 29), x= 15 (mod 31). Q Combine mod 11 and 29. Let x = 5+11+ 5+11t = 14 (mod 29) \$ 11t = 9 (mod 29) Inverse 17 = 8 (mod 29) , 80, 7= 8.9=14 Thus 22 5+11.14=159 (mod 319) (ii) Combine 2= 159 (mod 319) with a = 15 (mod leta= 159 + 3195 s=1. (a bom) a = 6 , which 159 +31953 15 (mod 31) = 3195 = 15-159 =-14 319 = 9 (mod 131), So, 95 = 11 (mod 31). Inverse 5 = 7 (mod 01), 80, 5 = 7,11 = 15 Then 2 = 159 + 319. 15 = 4949 321+5 80, 2 = 4944 (mod 9889) 3, 25 52 (mod 105) (Aus)

- (e) 2=5 (mod 6), 2=4 (mod 11), 2=3 (mod 17).
 - (i) Combine mod 6 and 11. Let 2=5+6t 5+6t=4 (mod 11) ≥ 6t=-1≥10 (mod 11). 61 ≥ 2 (mod 11)

50, t = 2. 11=9

Thus 22 5+ 6.9=59 (mod 86)

(ii) combine $2 = 59 \pmod{66}$ with $n = 3 \pmod{17}$ Let, 2 = 59 + 660

59 +664 = 3 (mod 17) =) SG4 = 3-59 = -56=12 mod 17

86= 15 (mod 17), 30 154 = 12 (mod 17). 151=8 (mod 1

So, 4= 8.12 =11

Then 2= 59+66.11= 785

So, 2= 785 (mod 1122) (Am.