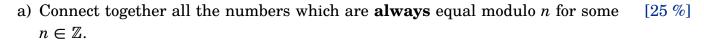
Congruences & CRT

3.AB PrelB Maths – Exam B

Unless specified otherwise, you are to **always** (at least briefly) explain your reasoning. Even in closed questions.

Congruences



$$3 n-1 -3$$
 $n-3 -1 3n^2-n-1$
 $3n+3 10n 0$

b) After finishing a meal in a restaurant, the waitress brings your check. You realize that you can either pay with **thirty-one four-dollar bills** or with **twenty-five five-dollar bills**, with the change in both scenarios being **smaller** than the bill used for payment.

[35 %]

Calculate the possible prices of the meal.

Chinese Remainder Theorem

Solve the following system of congruences.

[40 %]

$$x \equiv 6 \pmod{7}$$

 $x \equiv 3 \pmod{11}$
 $x \equiv 9 \pmod{10}$

Explain briefly why there is only one solution smaller than $7 \cdot 11 \cdot 10$.