SC205- Discrete Mathematics

Home Work 2

Week: January 13, 2020

Tutorial Discussion Week: January 20, 2020

(1) What is 3^{1024} in $\mathbb{Z}_7$?

(2) Find all solutions to the system of congurences

$$\begin{aligned} x &\equiv 1 \pmod 2 \\ x &\equiv 2 \pmod 3 \\ x &\equiv 3 \pmod 5 \\ x &\equiv 4 \pmod{11}. \end{aligned}$$

(3) Use Fermat's Little Theorem to compute $5^{2003} \pmod 7$, $5^{2003} \pmod{11}$ and $5^{2003} \pmod{13}$. Using these results and Chinese Remainder Theorem find $5^{2003} \pmod{1001}$.

(4) Show that 1729 and 2821 are Carmichael numbers.

(5) Write and implement code to do RSA encryption and decryption. Use it to send a message to someone in class. (For the sake of efficiency, you may use smaller numbers than are usually used in implementing the RSA algo.)