NUMBER THEORY HW 3: DUE TUESDAY, NOVEMBER 6, 2018

Question 1. *Show that* $(5443, 10993) = 1$ *and then find the multiplicative inverse of* 5443 *modulo* 10993. *Include your calculations.*

Question 2. *Find the integer* $a \in [0, 322]$ *such that* $41^{444} \equiv a \mod 323$. *Include your calculations.*

Question 3. *Find all solutions to the congruence*

$$x^2 + 5x + 24 \equiv 0 \mod 36.$$

Question 4. *Find all solutions to the congruence*

$$x^3 + x^2 - 5 \equiv 0 \mod 7^3.$$

Question 5. *Find all solutions to the congruence*

$$x^3 + 10x^2 + x + 3 \equiv 0 \mod 3^3.$$