1. Find all integer solutions to the congruence

$$37x \equiv 3 \pmod{97}.$$

2. Find the remainder when

$$(3^{122} + 7^{36})^{44}$$

is divided by 11.

3. Find all integers solutions (if any exist) to each of the congruences

$$x^2 + 3x + 7 \equiv 0 \pmod{11},$$
$$x^2 + 3x + 8 \equiv 0 \pmod{11}.$$