

Directions: Solve the following problems. All written work must be your own. See the course syllabus for detailed rules.

1. [JJJ 3.1] Solve the following congruences.

(a) $x^{19} \equiv 36 \pmod{97}$.

(b) $x^{137} \equiv 428 \pmod{541}$.

(c) $x^{73} \equiv 614 \pmod{1159}$.

(d) $x^{751} \equiv 677 \pmod{8023}$.

(e) $x^{38993} \equiv 328047 \pmod{401227}$. *Hint:* $401227 = 607 \cdot 661$.

2. [**Challenge**] Solve the following congruence: $x^{162881} \equiv 89 \pmod{794577}$.