MAT-255– Number Theory Spring 2024 In Class Work February 21

Your Name: _____ Group Members: _____ _____

Problem 1 *Let p be an odd prime. Use that* $\left(\left(\frac{p-1}{2}\right)!\right) \equiv (-1)^{(p+1)/2} \pmod{p}$ *to show*

(a) *If* $p \equiv 1 \pmod 4$, *then* $\left(\left(\frac{p-1}{2}\right)!\right)^2 \equiv -1 \pmod{p}$

(b) *If* $p \equiv 3 \pmod 4$, *then* $\left(\left(\frac{p-1}{2}\right)!\right)^2 \equiv 1 \pmod{p}$