

UW Math Circle
Homework
February 14, 2013

1. What is $17^{50} \pmod{3}$?
2. Show that $2222^{5555} + 5555^{2222}$ is divisible by 7.
3. Is it possible to find integers x and y so that $x^4 = 20y^2 + 2$?
4. Brave Sir Cosmo the Cosmonaut has invited his friends from Saturn over to his house for tea. Each of his friends lives on a different ring of Saturn where arithmetic is done modulo a different integer. After everyone left, Cosmo noticed that one of the guests left a uranium coin with the inscription " $32 \times 7 = 3$." On which rings of Saturn should Cosmo search for the owner of the coin?