MAT 246S **Practice Term Test 1** **Winter, 2013**

(1) Prove by mathematical induction that $n^3 + 5n$ is divisible by 6 for any natural n.
(2) Find the remainder when 7^{101} is divided by 101.
(3) Find the integer a, $0 \leq a \leq 20$ such that $13a \equiv 1(mod\ 20)$.
(4) Prove that if $m \equiv 1(mod\ \phi(n))$ and $(a, n) = 1$ then $a^m \equiv a(mod\ n)$, where ϕ is Euler's function.
(5) Suppose $3^{3^{100}}$ is written in ordinary way. What are the last two digits?
(6) Prove that $\sqrt[3]{\frac{2}{7}}$ is irrational.