Number Theory: Fermat's Little Theorem

(1) If $25x \equiv 3 \pmod{24}$, then find x modulo 24.

(2) What is the remainder when $2^{2007} + 1$ is divided by 11?

(3) Find the four smallest positive integers n for which $n^8 - n^2$ is not divisible by 504.

(4) Prove that for every positive integer n, $19 \cdot 8^n + 17$ is composite.

(5) Prove that for an arbitrary prime number p, there are infinitely many positive numbers n making $2^n - n$ divisible by p. (Hint: consider $p = 2$ and p odd separately, and note that $n = p - 1$ works for odd primes p.)