Math 173A - Group Theory and Big O Notation

1. Prove that if G is a finite commutative group with n elements, then $a^n = e$ for all a in G and the order of a divides n.

2. In each case prove that $f(n) = O(g(n))$.

   (a) $f(n) = 7n^2 + \sqrt{n}$, $g(n) = n^2$.

   (b) $f(n) = n^{300}$, $g(n) = 2^n$.

   (c) $f(n) = (\log n)^{375}$, $g(n) = n^{.001}$.

   (d) $f(n) = n^2 2^n$, $g(n) = e^{2n}$.