1064-20-173 **YONG YANG*** (yang@txstate.edu), Department of Mathematics, 601 University Drive, San Marcos, TX 78666. *Orbits of finite solvable linear groups.*

Suppose that a finite solvable group G acts faithfully, irreducibly and quasi-primitively on a finite vector space V. Then G has a uniquely determined normal subgroup E which is a direct product of extraspecial p-groups for various p. We denote $e = \sqrt{|E/\mathbf{Z}(E)|}$ (an invariant measuring the complexity of the group). We prove that when $e = 5, 6, 7$ or $e \geq 10$ and $e \neq 16$, G will have at least two regular orbits on V.

As an application of the orbit theorem, we settle a conjecture by Espuelas and Carlip. Suppose that G is a finite solvable group, V is a finite faithful G-module over a field of characteristic p and assume $O_p(G) = 1$. Let H be a nilpotent subgroup of G. Assume that H involves no wreath product $Z_r \wr Z_r$ for $r = 2$ or r a Mersenne prime, then H has at least one regular orbit on V.

Let G be a finite group and denote by $b(G) = \max\{\psi(1) \mid \psi \in Irr(G)\}$ the largest degree of an irreducible character of G. For solvable group, Gluck conjectures that $|G : \mathbf{F}(G)| \leq b(G)^2$. We prove Gluck's conjecture for all solvable groups with order not divisible by 3 as another application of the orbit theorem. (Received September 07, 2010)