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Abelian varieties of large analytic rank over function fields

I will discuss a simple linear algebra fact which allows one to produce lots of L -functions with large order zeroes at the critical point. Two sample applications:

- (1) for every p and every g there exist geometrically simple, non-isotrivial abelian varieties of dimension g over $F_p(t)$ with arbitrarily large analytic rank; and
- (2) if E is any elliptic curve over $F_q(t)$ with j -invariant not in F_q , then E obtains arbitrarily large analytic rank over extensions of the form $F_q(u)$, where t is a rational function of u .