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**Caleb McKinley Shor\*** ([cshor@wne.edu](mailto:cshor@wne.edu)), WNE Math Department, 1215 Wilbraham Rd.,  
Springfield, MA 01119. *Higher-order Weierstrass points on certain hyperelliptic curves,  
superelliptic curves, and associated towers.*

Higher-order Weierstrass points (or  $q$ -Weierstrass points) are special points on algebraic curves of genus  $g > 1$  which have associated weights. They are closely related to curve automorphisms.

In this talk, we consider  $q$ -Weierstrass points on curves in a few settings. We will look at certain hyperelliptic curves of genus 2 and 3. Considering various possible automorphism groups, we will see the distributions of weights for  $q = 2, 3$ . We will also look at superelliptic curves, which are curves of the form  $y^n = f(x)$  for  $f(x)$  a separable polynomial of degree  $d > n \geq 2$ . On such curves, all branch points are  $q$ -Weierstrass points for all  $q \in \mathbb{N}$ , and we will see how to compute their weights.

Finally, we'll consider towers of curves iteratively defined by equations of superelliptic curves. We will see how to compute the  $q$ -weights of certain points in these towers. Interestingly, the  $q$ -weight computations lead to some new results in the field of numerical semigroups. In particular, given a numerical semigroup generated by a geometric sequence of integers, for any  $m \geq 0$ , we will compute the sum of the  $m$ th powers of the natural numbers which are not in the semigroup.

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