

1077-O1-1578 **Randall E Cone*** (conere10@vmi.edu), 439 Mallory Hall, Virginia Military Institute, Lexington, VA 24450. *Grocery Bags and Lasers*.

In order to facilitate student participation in freshman-level undergraduate mathematics classes, we demonstrate two hand-on activities that engage the interest, and promote tacile involvement, of students in early calculus concepts. These activities are:

1. Using paper grocery bags to teach the chain rule in single-variable calculus. By labeling some bags with functions and other bags as their derivatives, then using one-bag-inside-another (with labels still showing) as composition, a nice hands-on exercise arises. This activity may be naturally initiated and motivated by first visualizing the product rule through similar use of grocery bags.

2. Using a tape measure and laser range finder, numerical approximations (e.g. the Trapezoidal and Simpson Rules) of integrals are motivated via students taking regularly-spaced measurements under a building archway. This exercise may be approximated in the classroom setting by drawing a large curve on a chalkboard and then taking measurements from the floor to a book held along the curve. (Received September 20, 2011)