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**Jeff A. Rosoff\*** ([jr@gac.edu](mailto:jr@gac.edu)), Gustavus Adolphus College, 800 W. College Avenue, Dept. of Mathematics and Computer Science, St. Peter, MN 56082. *Of Surfaces and Balls: Two Interesting Geometric and one Interesting Physical Application of the Integral.*

In this talk we will give solutions to three interesting problems/projects involving the integral that are non-standard in calculus courses but which are accessible to and doable by good students in these courses. The problems are: 1) Let  $C$  and  $D$  be curves of finite length given in the  $x$ - $z$  and  $y$ - $z$  planes respectively, meeting along the  $z$ -axis. Let  $S$  be the surface in 3-space generated by  $C$  and  $D$ . Which is larger: the area of  $S$  or the product of the lengths of  $C$  and  $D$ ? When are they equal? 2) The old problem of finding the volume of the ball of radius  $R$  in Euclidean  $n$ -space can be solved using a single integral and solving an easy recurrence relation. We will illustrate how to do this to find the volume as a nice function of  $R$  and  $n$ . 3) Suppose that you are buried at a point inside of a solid spherical planet of constant density, located  $r$  units from the planet's center. Is the gravitational force that you feel the same as if you were standing on a planet of radius  $r$ ; i.e would the force exerted on you by all of the planet's matter lying more than  $r$  units from the center total to zero? (Received September 26, 2005)