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John W Hoggard* (jhoggard@edinboro.edu), Dept. of Mathematics and Computer Science,
200 Doucette Hall, 215 Meadville St, Edinboro, PA 16444. *Drawing by hand and machine:*

Visualizing solids of revolution.

Calculus students have difficulty finding volumes of solids of revolution. We as teachers encourage students to draw the solids as an aid to visualization, but many students seem to lack the necessary drawing skills. How can we teach three-dimensional visualization? I will discuss three ways in which I have come to teach my students to draw (and visualize) solids of revolution in calculus: First, by a simplified direct drawing lesson; second, by physical models; and third, by computer animations and interactive web displays generated using the software *Mathematica*. The interplay of all three methods helps students learn to sketch (and visualize) the solids for themselves. (Received September 21, 2009)