MAT 202
Assignment 5
Wednesday, July 24, 2013

For full credit on these problems, each must be submitted with a complete and clear solution, showing all of your work. You may work with other classmates on these problems, but please indicate on your assignment if you received help. Partial answers and incomplete solutions may be eligible for some partial credit, depending on the level of completeness and demonstrated understanding.

1. Evaluate the following anti-derivative
   (a) $\int \frac{1}{1-x^2}\,dx$
   (b) $\int \frac{x}{1-x^2}\,dx$
   (c) $\int \frac{x^2+3x+3}{x-2}\,dx$
   (d) $\int \frac{x-2}{x^2+3x+3}\,dx$
2. Find the volume of the solid generated by revolving the region bounded by the equations
   $$y = 2x^2, \qquad y = 0, \qquad x = 2,$$
   about the y-axis, using the
   (a) disk method.
   (b) shell method.
3. Find the volume of the solid generated by revolowing the region bounded by the equations
   $$y = \frac{3}{1+x}, \qquad y = 0, \qquad x = 0, \qquad x = 3,$$
   about the line $y = 4$
4. A sphere of radius r can be obtained by revolving the curve $y = \sqrt{r^2 - x^2}$ about the x-axis.
   (a) Set up the integral to find the volume of the sphere using the disk method.
   (b) Find the formula for the volume of a sphere or radius r by integrating your integral in part (a).
5. Give a geometric argument that explains why the integrals
   $$\pi \int_0^2 \left[16 - (2y)^2\right]\,dy \qquad \text{and} \qquad 2\pi \int_0^4 x\left(\frac{x}{2}\right)\,dx$$
   have equal values. Integrate each to validate your suspicions.