Areas between Curves and Volumes

1. Find the area of the region bounded above by $y = e^x$, bounded below by $y = x$, and bounded on the sides by $x = 0$ and $x = 1$.

2. Find the area of the region enclosed by the parabolas $y = x$ and $y = 5x - x^2$

3. Find the area of the region bounded by the curves $y = \frac{x}{\sqrt{x^2+1}}$, $y = -\frac{x}{\sqrt{x^2+1}}$ and $x = 1$.
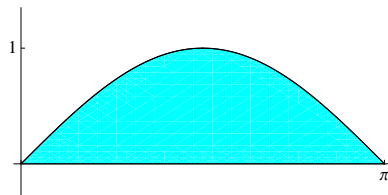
4. Find the area of the region bounded by the curves $y = \sin(x)$, $y = \cos(x)$, $x = 0$ and $x = \frac{\pi}{2}$.

5. Find the area of the region enclosed by the parabolas $x = y^2 - 4y$ and $x = 2y - y^2$

6. Find the volume of a sphere of radius r.

7. Find the volume of a pyramid whose base is a square with side $5\,\mathrm{m}$ and its height is equal to $9\,\mathrm{m}$.

8. The following region is given by the graph of $\sin(x)$ on the interval $[0,\pi]$.

If you rotate this region about the x-axis, what shape do you get? What is its volume? You may leave your answer as an integral.

9. Find the volume of the solid obtained by rotating about the x-axis the region under the curve $y = \sqrt{x}$ on the interval [0,1].