Homework 32

The **due date** for this homework is **Tue 7 May 2013 12:00 AM EDT**.

Question 1

The base of a solid is given by the region lying between the y-axis, the parabola $y = x^2$, and the line $y = 16$. Its cross-sections perpendicular to the y-axis are equilateral triangles. Find the volume of this solid.

- 1
- 2
- $32\sqrt{3}$
- $64\sqrt{3}$
- $2\sqrt{3}$
- $16\sqrt{3}$

Question 2

The base of a solid is given by the region lying between the y-axis, the parabola $y = x^2$, and the line $y = 4$. Its cross-sections perpendicular to the y-axis are squares. Find the volume of this solid.

- $\frac{16}{3}$
- $\frac{8}{3}$
- 8
- 16
- 2
- 4

Question 3

Find the volume of the solid whose base is the region enclosed by the curve $y = \sin x$ and the x-axis from $x = 0$ to $x = \pi$ and whose cross-sections perpendicular to the x-axis are semicircles.

- $\frac{\pi^2}{16}$
- π
- 0
- $\frac{\pi^2}{8}$
- π^2
- $\frac{\pi^2}{4}$

Question 4

Consider a cone of height h over a circular base of radius r. We computed the volume by slicing parallel to the base. What happens if instead we slice orthogonal to the base? What is the volume element obtained by taking a wedge at angle θ of thickness $d\theta$?

Hint: if you like, check to see that integrating over $0 \leq \theta \leq 2\pi$ gives the correct volume of $\pi r^2 h/3$.

- $dV = \frac{\pi}{3} r^2 h$
- $dV = \frac{1}{3} r^2 h \, d\theta$
- $dV = \frac{1}{6} r^2 h \, d\theta$

- $dV = 2r^2 h\, d\theta$
- $dV = \frac{1}{2} r^2\, d\theta$
- $dV = r^2 h\, d\theta$

Question 5

Find the volume of the following solid: for $1 \leq x < \infty$, the intersection of the this solid with the plane perpendicular to the x-axis is a circular disc of radius e^{-x}. Choose "$+\infty$" if the resulting integral diverges.

- $\frac{e^2}{2}$
- $\frac{\pi}{2e^2}$
- 15
- π
- $+\infty$
- $\frac{\pi - e}{3}$

☐ In accordance with the Honor Code, I certify that my answers here are my own work.

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