Math 131 Day 14

Practice

My Office Hours: M & W 12:30–2:00, Tu 2:30–4:00, & F 1:15-2:30 or by appointment. **Math Intern** Sun: 12–6pm; M 3-10pm; Tu 2–6, 7–1pm; W and Th: 5-10 pm in Lansing 310. Website: `http://math.hws.edu/~mitchell/Math131S13/index.html`.

1. Read 6.3 about the Disk or Slicing Method to calculate volumes. We will finish this material next time. Read 6.4 about volume by shells. Because of the three-dimensional nature of these problems, students often have difficulty with them. ☞ **Effort made now will pay off later.**

2. Area review. Sketch each region before finding its area:

a) Along the y-axis (more in the next problem). The area enclosed by $y = x - 4$ and $y^2 = 2x$. (Answer: 18)

b) The area in the first quadrant enclosed by $y = \cos x$, $y = \sin x$, and and the y axis. (Answer: $\sqrt{2} - 1$)

c) The area enclosed by $y = x^3$ and $y = \sqrt[3]{x}$. (Answer: 1)

d) The area enclosed by $y = x^3 + 1$ and $y = (x + 1)^2$. (Answer: 37/12)

3. a) Assigned last time Try page 388ff, integrating along the y axis: #23, 25, 29(y-axis only), 31(y-axis only), 45.

b) Find the area in the first quadrant enclosed by $y = \sqrt{x - 1}$, the line $y = 7 - x$, and the x-axis by integrating along the x-axis. Draw the figure. Then do it by integrating along the y-axis. (Answer: $\frac{22}{3}$.)

c) Find the area enclosed by $y = 2x^2$ and $y = x^2 + 4x$. Draw the figure. (Answer: $\frac{32}{3}$.)

4. Try this: A crystal prism is 10 cm long (see bottom of page figure on the left). Its cross-sections are isosceles right triangles. The heights are formed by the curve $y = x/2$. Find the volume of the prism. (Answer: 125/3 cu. cm)

Hand In

WeBWorK set `Day14`. Extra Credit: WeBWorK Day14Bonus: Determine the area enclosed by $y = x\sqrt{2x + 3}$ and $y = x^2$.

The answers to the first four problems are among these numbers: 1, $e^2 - 1$, 3, 37/12, $\ln(4) - \frac{1}{2}$, 9/4, 12, 8, and 8/3.

1. Find the area between the curves $y = x^3 + 2x^2$ and $y = x^2 + 2x$.

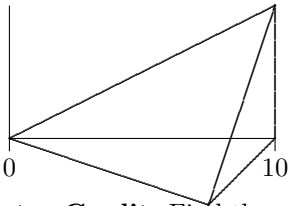
2. Let R be the region enclosed by $y = x$, $y = \frac{2}{x+1}$, and the y axis in the first quadrant. Find its area. *Be careful to use the correct region:* ***One edge is the y-axis.***

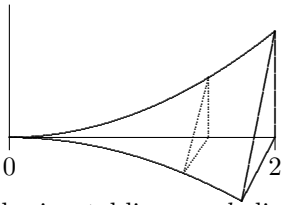
3. Integrate along the y-axis. Find the area of the region R enclosed by $y = \sqrt{x}$, $y = \sqrt{12 - 2x}$, and the x-axis in the first quadrant *by integrating along the y axis.* Be careful to use the correct region: **One edge is the x axis.**

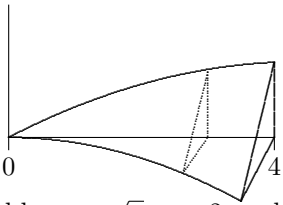
4. Find the area enclosed by $y = \arcsin(x)$, $y = \frac{\pi}{2}$, and the y-axis (first quadrant). Integration is possible only along one axis.
The answers for the next two are included in this list: $256\pi/15$, 256/15, 256/7, 16/5, $64\pi/7$, $128\pi/7$, 128/7, 32/5.

5. A crystal prism is 2 cm long (center figure below). Its cross-sections are isosceles right triangles. The heights are formed by the curve $y = x^2$. Find the volume of the prism. Label the base and height of the triangle cross-section in the figure.

6. A crystal prism is 4 cm long (right figure below). Its cross-sections are right triangles. The heights are formed by the curve $y = 2\sqrt{x}$ and the bases by the curve $y = x^2$. Find the volume of the prism.







7. Extra Credit. Find the number k so that the horizontal line $y = k$ divides the area enclosed by $y = \sqrt{x}$, $y = 2$, and the y axis into two equal pieces. Draw it first. This is easier if you integrate along the y axis.

8. Real Extra Credit. There is a line $y = mx$ through the origin that divides the area between the parabola $y = x - x^2$ and the x axis into two equal regions. Find the slope of this line. Draw it first. The answer is not a simple number. (Also see WeBWorK Day14Bonus.)