My Office Hours: M & W 2:30–4:00, Tu 2:00–3:30, & F 1:30–2:30 or by appointment. **Math Intern:** Sun: 2:00–5:00, 7:00–10pm; Mon thru Thu: 3:00–5:30 and 7:00–10:30pm in Lansing 310. Website: `http://math.hws.edu/~mitchell/Math131F15/index.html`.

Practice

1. **Test 1** Thursday in Lab. See Day 12 handout and website.

2. (*a*) Today we determine area between curves by integration along the y-axis. See Section 6.2 and the notes on line for more examples.
   (*b*) For Wednesday, read Section 6.3 on Volume using the Slicing and Disk Methods.
   (*c*) Practice: Try before class. Try page 417ff, integrating along the y axis: #23, 25, 29(y-axis only), 31(y-axis only), 45.

3. Area along the x-axis review. Sketch each region before finding its area:
   (*a*) The area in the first quadrant enclosed by $y = \cos x$, $y = \sin x$, and and the y axis. (Answer: $\sqrt{2} - 1$)
   (*b*) The area enclosed by $y = x^3$ and $y = \sqrt[3]{x}$. (Answer: 1)
   (*c*) The area enclosed by $y = x^3 + 1$ and $y = (x+1)^2$. (Answer: 37/12)
   (*d*) 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: $\frac{22}{3}$.)
   (*e*) Find the area enclosed by $y = 2x^2$ and $y = x^2 + 4x$. Draw the figure. (Answer: $\frac{32}{3}$.)

Hand In

WeBWorK set `Day13` Most of these are the same as the hand in problems below. Do them at the same time. Extra Credit: WeBWorK Day14Bonus: Determine the area enclosed by $y = x\sqrt{2x+3}$ and $y = x^2$.

1. Find the area between the curves $y = x^3 - 3x$ and $y = x^2 + 3x$. (Along the x-axis)

2. Sketch the region enclosed by $y = \arcsin x$, the line $x = \frac{\sqrt{2}}{2}$, and the x-axis in the first quadrant... see page 45 for a graph of the arcsine function. Determine its area. Which axis MUST you integrate along? Make sure one edge of the region is the x-axis.

3. Sketch and determine the area of the region enclosed by the curves $x = y(2-y)$ and $x = -y$. What axis should be used here?

4. (*a*) 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.
   (*b*) Do it instead by integrating along the y-axis.

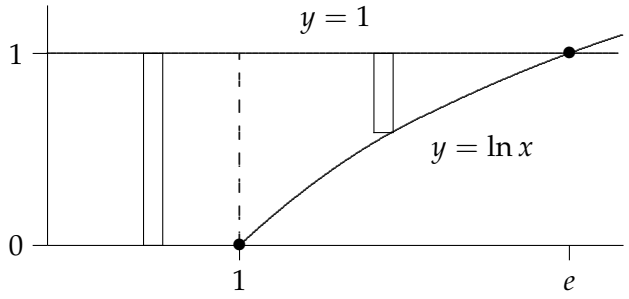
5. Sketch and determine the area of the region enclosed by $y = 4\ln x$ and the lines $x = 0$, $y = 0$, and $y = 10$. What axis is appropriate? (Algebra hint: $4\ln x = \ln x^4$.)

6. Determine the area enclosed by $y = x - 4$ and $y^2 = 2x$ by integrating along the y-axis. Sketch the region before finding its area.

7. **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.**

Class Work: Integration Along the y-axis

Motivation: Find the area of the region in the first quadrant enclosed by the graphs of $y = 1$, $y = \ln x$, and the x- and y-axes.



The region in the first quadrant enclosed by the graphs of $y = 1$, $y = \ln x$, and the x- and y-axes. There are two representative rectangles because the bottom curve changes.

(*a*) Set up the integral for the area of this region. Can you evaluate it? Why?

(*b*) What if we change our perspective and integrate along the y-axis? Draw the appropriate representative rectangle and determine the area.