

**Math 1550 Section 20**  
**Practice Test 4**  
**Monday November 12, 2012**

1. Calculate  $\int_0^1 x^{14} dx$ .

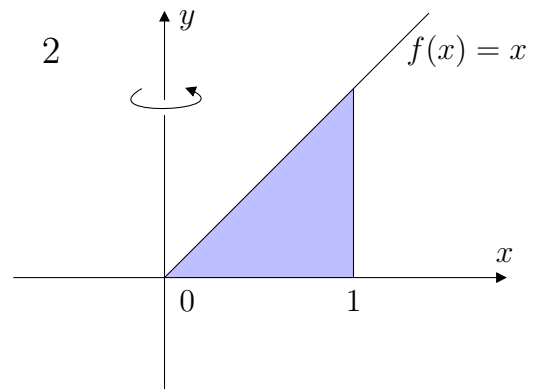
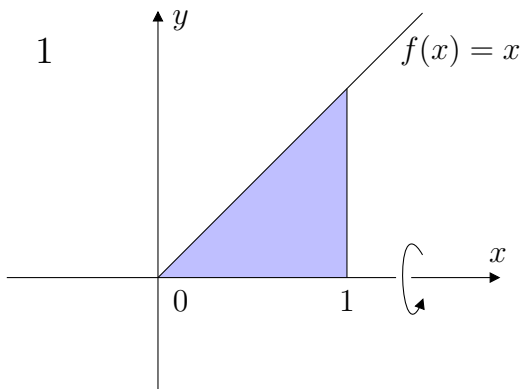
2. Calculate  $\int_0^R \sqrt{100 - x^2} dx$ . (Hint: the equation of a circle centered at the origin with radius 10 is  $x^2 + y^2 = 100$ .)

3. Calculate  $\int_1^e \frac{d}{dx} \ln(x) dx$ . (Hint: Use the Fundamental Theorem of Calculus and the fact that  $\ln x$  is an antiderivative of its derivative.)

4. Find a nonzero constant  $a$  such that  $\int_0^a \sin(x) dx = 0$ . (Hint: Think about areas cancelling.)

5. Calculate  $f(x) = \int_0^x \left( \int_0^y \left( \int_0^z dt \right) dz \right) dy$  by doing the innermost integral first, then the next integral, and so on.

6. Consider two solids of revolution. The first comes from revolving the region between the graph of  $f(x) = x$  and the  $x$ -axis from  $x = 0$  to  $x = 1$  around the  $x$ -axis, and the second comes from revolving the same region around the  $y$ -axis. What is the sum of the two volumes?



7. Calculate  $\int x^{-1} dx$ .

8. Calculate  $\int \frac{\sin(x)}{\cos^2(x)} dx$ . (Hint: Use integration by substitution.)

9. Calculate  $\int \frac{xe^{x^2}}{1 + e^{2x^2}} dx$  (Hint:  $\frac{d}{du} \tan^{-1}(u) = \frac{1}{1 + u^2}$ ).

10. Calculate the volume of the solid obtained by revolving the region between the graph of  $f(x) = x^2$  and the  $x$ -axis from 0 to 1 around the  $y$ -axis, using the method of cylindrical shells.

