18.01A Recitation — Monday, Sept. 17, 2018

Quick Review:

- Second fundamental theorem: given a continuous f, define $A(x) = \int_a^x f(t)dt$. Then $A(x)$ is differentiable and $A'(x) = f(x)$.
- Area bounded by $y = f(x)$ and $y = g(x)$ between $x = a$ and $x = b$ (assuming $f(x) \geq g(x)$) is given by $\int_a^b f(x) - g(x)dx$.
- Volume of revolution: disk and shell method
- Arclength. $ds = \sqrt{1 + (f')^2}dx$

Practice problems:

1. Use Second Fundamental Theorem of Calculus to evaluate the following derivatives.

   (a)
$$\frac{d}{dx}\int_1^{x^2} \frac{dt}{\sqrt{t + \sqrt{t+1}}}$$

   (b)
$$\frac{d}{dx}\int_x^{x^2} \frac{dt}{1+t^4}$$

2. Find the area of the region bounded by the following curves:

$$x = y^2, y = x + 3, y = -2, y = 1.$$

3. Find the volume of the solid of revolution generated when the area bounded by

$$y = 2x - x^2, y = 0$$

(a) is revolved about the x-axis;

(b) is revolved about the y-axis.