

Math 134: Homework 7

Due November 12

1. Let  $F(x) = \int_{\sqrt{x}}^{x^2+x} \frac{dt}{2 + \sqrt{t}}$ . Compute  $F'(x)$ .
2. Assume that  $f$  and  $g$  are functions so that  $f$ ,  $g$ ,  $f'$ , and  $g'$  are all continuous on  $[a, b]$ . Show that

$$\int_a^b f'(x)g(x) dx = f(b)g(b) - f(a)g(a) - \int_a^b f(x)g'(x) dx.$$

**Hint:** Compute  $\int_a^b (f(x)g(x))' dx$  in two ways.

3. At each point  $(x, y)$  of some curve, the slope is given by the function  $g(x)$ . The curve passes through the point  $(x_0, y_0)$ . Find an equation  $y = f(x)$  for the curve.

**Hint:** Try an example first: say, the slope of the curve at the point  $(x, y)$  is  $2x$  and the curve goes through the point  $(0, -3)$ . What is the equation of the curve?