

Math 134: Homework 7

Due November 10

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. Prove that if f is continuous on $[a, b]$ and if

$$\int_a^b |f(x)| dx = 0,$$

then $f(x) = 0$ for all $x \in [a, b]$. **Hint:** See exercise 50 in Section 2.4.

4. 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?