MATH 134 – Calculus with Fundamentals 2
Practice Day on Antiderivatives
February 5, 2018

*Background*

If $f(x)$ is a given function and $F(x)$ is another function that satisfies $F'(x) = f(x)$, then we say $F(x)$ is an *antiderivative* of $f(x)$. Today we are going to practice on finding antiderivatives of functions defined by formulas by using our basic derivative rules, but "in reverse."

*Questions*

(1) Find an antiderivative for $f(x) = x^3 + 4x^2 + \sqrt{x} + 1$. Check your answer by differentiating. Is your function $F(x)$ the *only* antiderivative of $f$? Why or why not?

(2) Find an antiderivative for $f(x) = e^{-4x} + e^{2x}$. Check your answer by differentiating.

(3) Find an antiderivative for $f(x) = \cos(x) + \sec^2(x)$.

(4) Find an antiderivative for $f(x) = \dfrac{5}{\sqrt{1-x^2}} + \dfrac{7}{1+x^2}$.

(5) Find an antiderivative for $f(x) = \dfrac{1}{x+5}$. Check your answer by differentiating. What if it was $f(x) = \dfrac{1}{2x+5}$?

(6) Find an antiderivative of $f(x) = \sin(x)$ and use it to evaluate

$$\int_0^\pi \sin(x) \, dx.$$

Interpret via areas. (Note: Your answer should be strictly positive. Why?)