

Math 129-8H Project 1

Due October 20, in class

Part A:

1) Show that

$$\cos x = \frac{e^{ix} + e^{-ix}}{2}$$
$$\sin x = \frac{e^{ix} - e^{-ix}}{2i}.$$

2) Derive II-10, II-11, II-12 in the table of integrals by replacing $\sin ax$, $\sin bx$, $\cos ax$, and $\cos bx$ using the previous exercise, and then doing the integration. (Do not simply check by doing the differentiation.)

3) For II-23, give examples of the use of each of the 5 cases (each case is a sentence).

4) Derive II-22 in the table. Use the fact that

$$\frac{1}{\cos x} = \frac{\cos x}{\cos^2 x} = \frac{\cos x}{1 - \sin^2 x}.$$

Part B:

1) Read pp. 378-379 on computing arclength. The first part shows how to compute arclength of a curve described as $y = f(x)$ (the graph of a function f). The second part shows how to compute arclength of a curve described by $x = f(t)$, $y = g(t)$, with t in some interval (this is called a parametric curve).

2) As a warm up, do problems 11, 12, 15, 16, 41 in Chapter 8.2.

3) Now read project 3 on pages 435-436 and do a-d.