Assignment 10

Coverage: 16.5, 16.6 in Text.

Exercises: 16.5 no 4, 8, 10, 13, 17, 19, 24, 33, 42, 48, 56; 16.6 no 4, 7, 10, 15.

Hand in 16.5 no 19, 33, 48, 56; 16.6 no 10 by Nov 23.

Supplementary Problems

1. Let $(x(t), y(t))$, $t \in [a, b]$, be a curve C parametrized by t in the first quadrant. Rotate it around the x-axis to get a surface of revolution S.

   (a) Show that a parametrization of S is given by $(\alpha, t) \mapsto (x(t), y(t) \cos \alpha, y(t) \sin \alpha)$ $\alpha \in [0, 2\pi]$, and it is regular when C is regular.

   (b) Show that the surface area of S is given by

$$2\pi \int_C y(t) \, ds \ .$$

   (c) When $y = f(x), x \in [a, b]$, where f is C^1, the surface area becomes

$$2\pi \int_a^b f(x) \sqrt{1 + f'^2(x)} \, dx \ .$$