Assignment 8

Coverage: 16.1, 16.2 in Text.

Exercises: 16.1 no 10, 12, 15, 21, 22, 25, 27, 30, 32. 16.2 no 11, 15, 21, 25, 27, 29, 30, 32, 35.

Hand in 16.1 no 15, 25, 16.2 no 21, 29, 35 by November 9.

Supplementary Problems

1. Let $\mathbf{r}_1$ and $\mathbf{r}_2$ be on $[a,b]$ and $[\alpha,\beta]$ respectively that describe the same curve C. It has been shown that there exists some φ maps $[a,b]$ one-to-one onto $[\alpha,\beta]$, $\varphi'(t) > 0$, such that $\mathbf{r}_2(\varphi(t)) = \mathbf{r}_1(t)$ when both parametrization runs in the same direction. When they runs in different direction, $\varphi'(t) < 0$. Using this fact to prove that in both cases,

$$\int_a^b f(\mathbf{r}_1(t))|\mathbf{r}_1'(t)|\,dt = \int_\alpha^\beta f(\mathbf{r}_2(z))|\mathbf{r}_2'(z)|\,dz\ .$$

   In other words, the line integral

$$\int_C f\,ds$$

   is independent of the choice of parametrization with the same or opposite direction.