Homework 8

Multivariable Calculus

Due: May 8, 2023, 23:59

Computational problems are graded for completion, each problem is worth 1 points.

Conceptual problems are graded for correctness, each problem is worth 5 points.

Show all your work to get full credits for each problem.

1 Computational

Do the following problems in Stewart's calculus textbook, 8th edition.

Section 16.2: 7-12, 17,18, 19-22, 34,35

Section 16.3: 3-10, 15-18, 19-20, 35

2 Conceptual

Problem 1. Let C be a smooth curve given by a parametrization $\mathbf{r}(t)$, $a \leq t \leq b$. Show that

$$\int_C \mathbf{r} \cdot d\mathbf{r} = \frac{1}{2}\left(|\mathbf{r}(b)|^2 - |\mathbf{r}(a)|^2\right)$$

Problem 2. Given a curve C with a parametrization $\mathbf{r}(t)$, $a \leq t \leq b$, and the notation $-C$ to be the same curve but in the reversed direction.

1. Give the formula we discussed in class about a parametrization for $-C$.
2. Show that
$$\int_{-C} \mathbf{F} \cdot d\mathbf{r} = -\int_C \mathbf{F} \cdot d\mathbf{r}\,.$$