Fundamental Theorem for Line Integrals

1. Let $f = xy + \mathrm{e}^x$.

a) Compute $\mathbf{F} = \boldsymbol{\nabla} f$.

b) Compute $\displaystyle\int_C \mathbf{F} \cdot d\mathbf{r}$ for each of the following paths from (0,0) to (2,1).

i) The path consisting of a horizontal segment followed by a vertical segment.

ii) The path consisting of a vertical segment followed by a horizontal segment.

iii) The straight line from (0,0) to (2,1).

c) All of the answers to part (b) should be the same. Show they agree with the answer given by the fundamental theorem for line integrals.

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