$$
\begin{aligned}
\nabla\psi\left(\overrightarrow{x}\right) &= \left(-E_y\left(\overrightarrow{x}\right), E_x\left(\overrightarrow{x}\right)\right) \\
\psi\left(\overrightarrow{x}\right) &= \int_\gamma \nabla\psi\left(\overrightarrow{s}\right) \cdot d\overrightarrow{s} \\
\psi\left(\overrightarrow{0}\right) &= 0 \\
let\,\overrightarrow{r}(t) &= \hat{x}t,\, \overrightarrow{r} : [0, \|\overrightarrow{x}\|] \to \mathbb{R}^2 \\
\overrightarrow{r}'(t) &= \hat{x} \\
\psi\left(\overrightarrow{x}\right) &= \int_0^{\|\overrightarrow{x}\|} -\hat{x}_x E_y\left(\hat{x}t\right) + \hat{x}_y E_x\left(\hat{x}t\right) dt
\end{aligned}
\tag{1}
$$