Warm-Up for February 25th, 2022

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February 25, 2022

1 Memory Bank

1. Curl of **E**-fields: $\nabla \times \mathbf{E} = 0$.
2. Potential of the **E**-field: $V(\mathbf{r}) = -\int_{\mathcal{O}}^{\mathbf{r}} \mathbf{E} \cdot d\mathbf{l}$. We usually take $\mathcal{O}$ to be infinitely far from charge.

2 Multiple Choice

Which of the following are **E**-fields?

- A: $\mathbf{E}_1 = ay\hat{x} + bx\hat{y}$
- B: $\mathbf{E}_2 = ay\hat{x} + ax\hat{y}$
- C: $\mathbf{E}_3 = a\hat{x} + b\hat{y}$
- D: $\mathbf{E}_4 = \frac{kg}{y^2}\hat{y}$

3 Exercise

Find the potential (a) outside and (b) inside a spherical shell of radius R that carries a uniform surface charge. First use Gauss' law to obtain the field in each region, then use the definition of $V(\mathbf{r})$ properly.