Each of the four (4) diagrams below and on the reverse side of this page represents a vector field $\vec{F}(x, y)$ mapped in the $x$-$y$ plane. (That is, each map depicts a vector quantity whose magnitude and direction vary with $x$ and $y$.) For each vector field shown, answer the following two questions:

i. Is the curl of that vector field equal to zero everywhere in the $x$-$y$ plane? Explain how you can tell.

ii. If that vector field represented a force, would the force be conservative or non-conservative? Explain your reasoning.

Case #1

i. Is curl $\vec{F}(x, y) = 0$ everywhere? Explain.

ii. Conservative or non-conservative? Explain.

Case #2

i. Is curl $\vec{F}(x, y) = 0$ everywhere? Explain.

ii. Conservative or non-conservative? Explain.

(continued on other side)
i. Is \( \nabla \times \vec{F}(x,y) = 0 \) everywhere? Explain.

ii. Conservative or non-conservative? Explain.