Possible distributions of steady currents. Consider each of the following four vectors in the Cartesian coordinate system: $\mathbf{J}_1 = J_0\mathbf{a}_x$, $\mathbf{J}_2 = J_0(x/\alpha)\mathbf{a}_x$, $\mathbf{J}_3 = J_0(xy/\alpha^2)\mathbf{a}_x$, $\mathbf{J}_4 = J_0(y/\alpha)^2\mathbf{a}_x$, where J_0 and α are constants. Which of them can be the density vector of a steady-state current in a conducting medium?

(A) $\mathbf{J}_1$ only.
(B) $\mathbf{J}_1$ and $\mathbf{J}_2$ only.
(C) $\mathbf{J}_1$ and $\mathbf{J}_4$ only.
(D) $\mathbf{J}_4$ only.
(E) All of the vectors.
(F) None of the vectors.

Solution: (C)
Answer: (C)