1) Take $f_t(x,y) = (1-t)(x,y) + t\left(\frac{x,y}{\max\{|x|,|y|\}}\right)$

$f_0(x,y) = (x,y)$

$f_1(x,y) = \frac{x,y}{\max\{|x|,|y|\}}$, $= x,y$ as $\max\{|x|,|y|\} = 1$ for points at the boundary