1. In each of the following either find the limit (if it exists) or show that the limit does not exist. Fully justify your answer.

   (a) [3 pts] $\lim_{(x,y)\to(0,0)} \dfrac{y^4}{x^4+y^4}$

   (b) [3 pts] $\lim_{(x,y)\to(0,0)} xy\sin\left(\dfrac{1}{x^2+y^2}\right)$

   (c) [3 pts] $\lim_{(x,y)\to(0,0)} \dfrac{x^2ye^y}{x^4+5y^2}$