1. Find the directional derivative of \( f(x, y) = xe^y \) as you leave the point \( P(2, 3) \) heading in the direction of \( Q(3, 2) \).

2. A. Convert the function \( z = f(x, y) \) below into cylindrical coordinates (simplify).

\[
z = f(x, y) = \frac{xy^3 - x^3y}{(x^2 + y^2)^2}
\]

B. Show the limit below does not exit. [Hint: Look along the lines with \( y = mx \).]

\[
\lim_{(x,y) \to (0,0)} \frac{xy^3 - x^3y}{(x^2 + y^2)^2}
\]