TUTORIAL 4

MA1132: ADVANCED CALCULUS, HILARY 2017

(1) Compute the following partial derivatives and values of partial derivatives.
   (a) The partial derivatives f_x and f_y when $f(x, y) = x^4y - \sqrt{xy} + \log(x)\sin(y)$.
   (b) The value
   $$\frac{\partial z}{\partial x}\bigg|_{x=3,\ y=2}$$
   for $z = \frac{x^2+y^2}{x-y}$.

(2) (a) Find the linearization, or the linear approximation, $L(x, y)$ of the function $f(x, y) = xe^{xy}$ near the point $(x_0, y_0) = (1, 0)$.
   (b) Use your answer from a) to approximate the value $f(0.99, 0.2)$.

(3) We saw that Clairaut's Theorem guarantees that for "nice" functions, we can compute mixed second order partial derivatives in different orders and obtain the same answers. Here you will check a special case of this by direct computation. Namely, compute the partial derivatives directly to check that
$$f_{xz} = f_{zx}$$
when $f(x, y, z) = \sin(x + y)(x^3y - y^2z)$.