TUTORIAL 5

MA1132: ADVANCED CALCULUS, HILARY 2017

(1) Use the chain rule to find $\frac{dz}{dt}$ when
$$z = \sin(xy) + e^{xy}, \qquad x = t^2, \qquad y = t.$$
Check your answer by directly plugging in $x = t^2$ and $y = t$ into z and taking the derivative with respect to t.

(2) Suppose that
$$w = \frac{xy}{x^2 + z^2}, \qquad x = r + s, \quad y = r - s, \quad z = 1.$$
Use the chain rule to find $\frac{\partial w}{\partial s}$.

(3) Suppose that $f(x, y) = x \cos y - y \sin x$ and $(x_0, y_0) = (\pi/2, \pi)$. Find the directional derivatives of f at (x_0, y_0) in the directions of the following two vectors:
   (a) $(3/5, -4/5)$,
   (b) $(1, 2)$.