(1) Find the rate of change of $f(x, y) = xe^y$ at the point $P(2, 0)$ in the direction from $P$ to $Q(\frac{1}{2}, 2)$.

(2) If $z = f(x, y)$ has continuous second partial derivatives and $x = r^2 + s^2$ and $y = 2rs$, find $\frac{\partial^2 z}{\partial r^2}$.

(3) If $f(x, y) = x^2 - xy + \frac{1}{2}y^3 + 3$, then find an upper bound for the error in the approximation of $f(x, y) \simeq L(x, y)$ over the rectangle $R : |x-3| \leq 0.1, |y-2| \leq 0.1$. 