

Show all work. Incomplete answers may receive little or no credit. You need not simplify your answers.

1. (a) Find the linearization of $f(x,y) = \cos \pi x + xy^2$ at the point $(2,1)$.

(b) Use your answer to part (a) to estimate $f(1.9,1.2)$. You do not need a calculator for this.
(Note: My calculator gives $f(1.9,1.2) = 3.731$)

2. Let $z = x^2y + \cos y - 5x$ while $x = t^3 + s^3$ and $y = s^2e^t$.

(a) Write down the chain rule formula for $\frac{\partial z}{\partial t}$.

(b) Use the chain rule to find $\frac{\partial z}{\partial t}$. (Give your answer in terms of s and t , but do not simplify at all.)