

Show all work. 5 points each.

1. Use the chain rule to find $\partial z/\partial t$ and $\partial z/\partial t$ where $z = x^2y^3$ $x = s \cos(t)$, $y = s \sin(t)$

2. Find the maximum rate of change of $f(x, y) = \sin(xy)$ at the point $(1, 0)$ and the direction in which it occurs.