

Chain Rule

1. The temperature on a hot surface is given by

$$T = 100 e^{-(x^2+y^2)}.$$

A bug follows the trajectory $\mathbf{r}(t) = \langle t \cos(2t), t \sin(2t) \rangle$.

- a) What is the rate that temperature is changing as the bug moves?
b) Draw the level curves of T and sketch the bug's trajectory.

2. Suppose $w = f(x, y)$ and $x = t^2$, $y = t^3$. Suppose also that at $(x, y) = (1, 1)$ we have $\frac{\partial w}{\partial x} = 3$ and $\frac{\partial w}{\partial y} = 1$. Compute $\frac{dw}{dt}$ at $t = 1$.

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