Section 4.6 Additional Problems

1. A bug is located at $\langle 3, 9, 4\rangle$ (position measured in centimeters) and walks towards the point $\langle 5, 7, 3\rangle$ at a rate of 2 cm/s. The temperature at each location in space is $T(x, y, z) = xe^{y-z}$ in degrees Celcius. What is the rate of change of temperature seen by the bug?

2. Suppose a temperature field $T(x, y)$ satisfies $\nabla T = \langle y - 4, x + 2y\rangle$. Yet another bug follows a path $\mathbf{r}(t) = \langle t^2, t\rangle$. At what times t does the bug report that $d/dtT(\mathbf{r}(t)) = 0$.