

MATH 2220 HW3.

Due Wednesday 17 September

(1) Find

$$\lim_{(x,y) \rightarrow (0,0)} \frac{x}{x^2 + y^2}$$

or show that it does not exist.

(2) Section 2.3, p. 139-141

(a) # 1(d).

(b) # 4(b).

(c) # 5.

(d) # 7(c).

(e) # 9.

(3) The temperature at a point $(x, y, z) \in \mathbb{R}^3$ is given by $T(x, y, z) = e^{(10-x)^2} + e^{-y^2} + e^{-z^2}$.

(a) A flamingo flies along the path

$$f(t) = (0, t, t^2 + 5).$$

Find the rate of change of temperature experienced by the flamingo at $t = 0$, ie.

find $\frac{d}{dt}|_{t=0}(T \circ f(t))$.

(b) A goose flies along the path

$$g(t) = (t^3, \sin(t), 5e^t + t^3 + t^2 - 5t).$$

Find the rate of change of temperature experienced by the goose at $t = 0$.

(c) Suppose that the temperature (in degrees) was given by some other function $T_1(x, y, z)$ and that the flamingo experienced a rate of change of temperature of 5 degrees per second at $t = 0$. Is it possible to determine the rate of change of temperature experienced by the goose at $t = 0$? Explain.