Math 203 (Quenell) | Solution
Quiz 4 | 4 October 2001

1. Here is a table of values for a function $g(x,t)$. Given that g is a linear function, fill in all the missing values.

		x = 10	20	30	40
t	100	2	5	8	11
	200	0	3	6	9
	300	-2	1	4	7

2. If $f(x,y) = xe^{-(x^2+y^2)}$, find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$.

Solution: We have

$$\begin{aligned} \frac{\partial f}{\partial x} &= x(-2xe^{-(x^2+y^2)}) + e^{-(x^2+y^2)} \\ &= (1-2x^2)e^{-(x^2+y^2)} \quad \text{and} \\ \frac{\partial f}{\partial y} &= -2xye^{-(x^2+y^2)}. \end{aligned}$$

3. Find the local linearization of the function $h(x,y) = \frac{x^3}{y}$ at the point $(1,2)$.

Solution: We have $\frac{\partial h}{\partial x} = \frac{3x^2}{y}$ and $\frac{\partial h}{\partial y} = -\frac{x^3}{y^2}$, so that

$$\begin{aligned} \left.\frac{\partial f}{\partial x}\right|_{(1,2)} &= \frac{3}{2} \quad \text{and} \\ \left.\frac{\partial f}{\partial y}\right|_{(1,2)} &= -\frac{1}{4}. \end{aligned}$$

We also note that $h(1,2) = \frac{1}{2}$. The local linearization is

$$\frac{1}{2} + \frac{3}{2}(x-1) - \frac{1}{4}(y-2).$$