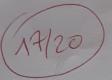
INSA INSTITUT NATIONAL DES SORPICES APPLIQUÉES LYON



SCAN 2 — Quiz #9 — 12'

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Name:

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Exercise 1. Let U be an open subset of \mathbb{R}^n (with $n \in \mathbb{N}^*$) and let $v : U \to \mathbb{R}$ be a function of class C^2 . Let $p_0 \in U$. Recall the second-order Taylor-Young formula for v at p_0 (the general formula, with matrices).

2 (p. h) = 3(p0) + J(p0) 2. [h] std + 1/2 [h] std (tpo) 2 [h] std + 1/2 (11 h) 1 + 0 (11 h) 1 +

Exercise 2. Let $n \in \mathbb{N}^*$ and $k \in \mathbb{N}^* \cup \{+\infty\}$, let V_1 and V_2 be two open subsets of \mathbb{R}^n and let $u: V_1 \to V_2$ be a function. Recall the definition of "u is a C^k -diffeomorphism."

U is a Ck diffeomorphism of the following statements one true:

• U is of class Ck on V1

• U is a bijection
• U^{G13} is of class Ck on V2

f (bx, 1+ly) = 1 + (hx + hy) + f (hx + 3hy 3hx) (hy) + o (11218)

= 1 + (hx + hy) + f (hx + 3hyh) + 3hxhy | + o (11218)

= 1 + hx + hy + hx2 + 8hyh2 92 + o (11218)

2. Deduce the value of the following limit (and briefly justify why this limit exists):

 $\ell = \lim_{(x,y)\to(0,1)} \frac{ye^{xy} - 1 - x - (y-1) - x^2/2}{x(y-1)}$