

1. True or False?

If  $f : \mathbb{R} \rightarrow \mathbb{R}$  is continuously differentiable, then the set of critical points

$$C = \{x \in \mathbb{R} : f'(x) = 0\}$$

is a closed subset of  $\mathbb{R}$ .

2. True or False?

If  $f, g : \mathbb{R} \rightarrow \mathbb{R}$  are both  $C^k$ , then  $f + g$  is also  $C^k$ .

3. True or False?

The following function  $f : \mathbb{R} \rightarrow \mathbb{R}$  is smooth.

$$f(x) = \begin{cases} e^{-1/x} \sin(1/x) & \text{if } x > 0 \\ 0 & \text{if } x \leq 0 \end{cases}$$