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Explain why  $\phi(x + u) = \phi(x) + \nabla\phi(x)^T u + \frac{1}{2}u^T H_\phi(x + \xi u)u$  for some  $\xi \in [0, 1]$ , assuming  $\phi$  is  $C^2$  in a ball containing  $x$  and  $x + u$ .