

Math 20E

August 7, 2017

Question 1 The derivative of a real-valued function $f(x, y)$ (i.e., $f : \mathbb{R}^2 \rightarrow \mathbb{R}$) at a point (a, b) is

A. a number.

B. the slope of the tangent plane at (a, b) .

C. the matrix of partial derivatives of f at (a, b) .

D. the gradient of f at (a, b) .

***E.** either **C** or **D**.

Question 2 Given a path $\mathbf{c}(t)$ in \mathbb{R}^n , its derivative $\mathbf{c}'(t)$ represents a tangent vector to the corresponding curve at all values of t where

A. the path $\mathbf{c}(t)$ is continuous.

B. the derivative $\mathbf{c}'(t)$ exists.

C. the derivative $\mathbf{c}'(t)$ is not zero.

D. **B** and **C**.

***E.** **A**, **B** and **C**. If $\mathbf{c}'(t)$ exists at t , then $\mathbf{c}(t)$ is continuous at t .

Question 3 Given a real-valued function $f(x, y, z)$ (i.e., $f : \mathbb{R}^3 \rightarrow \mathbb{R}$), the gradient of f at the point (a, b, c) is

- A.** $Df(a, b, c)$, the derivative of f at (a, b, c) .
- B.** A vector that is normal to the level surface $f(x, y, z) = f(a, b, c)$.
- C.** A vector that points in the direction of greatest increase of $f(x, y, z)$ from (a, b, c) .
- D.** both **B** and **C**.
- *E.** **A**, **B** and **C**.