

Math 20E

August 5, 2014

**Question 1** The derivative of a function  $f(x, y)$  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.** both **C** and **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 derivative  $\mathbf{c}'(t)$  exists.
- B.** the derivative  $\mathbf{c}'(t)$  is continuous.
- \***C.** the derivative  $\mathbf{c}'(t)$  exists and is not zero.
- D.**  $\mathbf{c}'(t)$  is a unit vector.
- E.** both **B** and **C**.

**Question 3** Given a function  $f(x, y, z)$ , 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 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**.