# Math 20E

## August 6, 2013

**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.** $\mathbf{D}f(a, b, c)$, 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**.