# Quiz 7 Math 2202

**Guidelines**

- This quiz is for you to test yourself on what we've been studying recently.
- You may and should use it when doing the online quiz later today (or tomorrow).
- You have 10 minutes. As a section, we will go over the quiz (or part of it). Solutions will be posted online as well.

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1. Compute the directional derivative of $f(x, y) = 3x^2 - 2e^{xy}$ at the point $(1, 0)$ in the direction of $\langle -3, 5 \rangle$.

   What does this number represent?

2. **Which of the following are true?** Choose all that are true.

   Consider again $f(x, y) = 3x^2 - 2e^{xy}$.

   (a) The gradient $\nabla f(1, 0)$ is a vector in $\mathbf{R}^3$ representing how $f(x, y)$ is changing most quickly.

   (b) The vector $-\nabla f(1, 0)$ is the direction of greatest decrease of $f(x, y)$ at the point $(1, 0)$.

   (c) If $\mathbf{u}$ is a unit vector in the direction of $\nabla f(1, 0)$, then $D_{\mathbf{u}} f(1, 0) = \nabla f(1, 0)$.

   (d) The gradient $\nabla f(1, 0)$ is perpendicular to the graph of $f(x, y)$ at $(1, 0)$.

*Think about it...* Show that every plane that is tangent to the cone $x^2 + y^2 = z^2$ passes through the origin. (Start by creating the tangent plane to a generic point $(x_0, y_0, z_0)$ on the cone, thinking of the cone as a level surface of $F(x, y, z) = x^2 + y^2 - z^2$.) ).