True/False Tailgate
Defend your responses

1. $\lim_{(x,y)\to(0,0)} \dfrac{\sin(y)}{x} = 0$
2. The directional derivative of a function f in a direction u, where $||u|| = 1$ is defined $D_u f = u \cdot \nabla f$.
3. The equation $\phi = \pi/4$ (in spherical coordinates) describes a plane.
4. The equation $\theta = \pi/4$ (in spherical or polar coordinates) describes a plane.
5. If $F(x, y, z) = 0$, then $\frac{\partial x}{\partial y}\frac{\partial y}{\partial z}\frac{\partial z}{\partial x} = -1$.
6. All differentiable functions are continuous.
7. If the gradient of a function exists then it is differentiable.
8. Areas of regions are preserved by the transformation $x = 2u + v$, $y = 3u + 2v$.
9. The tangent plane to $z = x^2 - y^2$ at $(1, 1, 0)$ is horizontal.
10. $\int_0^1 \int_{x^4}^{x^2} xy^2 dydx = \int_0^1 \int_{y^{1/4}}^{y^{1/2}} xy^2 dxdy$

Bears Problems
Not just the lack of Urlacher

1. Soldier field, at first approximation, can be described by the region between $z = \frac{1}{3}(x^2 + y^2)$, $x^2 + y^2 + z^2 = 4$, and above $z = 0$. Find the volume of the stadium using these surfaces. *Hint, use cylindrical polar coordinates.*
2. What units would make this number a decent approximation?
   This would never be on the exam, but google asks this type of question to their job applicants.