Name: _____

Math 253 Calculus III (Bueler) Wednesday 21 March 2018

Quiz #7

In class. 25 minutes. No textbook or notes or calculator. 30 points total.

1. (*5 pts*) Find the directional derivative of the function at the given point in the direction of the given vector:

$f(x,y) = e^x \sin y, \qquad P(0,\pi/3), \qquad \mathbf{v} = \langle -6, 8\rangle$

2. (*10 pts*) Find an equation of the tangent plane to the given surface at the point:

$$x = y^2 + z^2 + 1, \qquad (3,1,-1)$$

Write the equation of the tangent plane in the standard form $ax + by + cz + d = 0$.

3. **(a)** (*10 pts*) Find all the critical points of

$$f(x, y) = 2x^2 + y^4 + 4xy$$

(b) (*5 pts*) For each critical point from **(a)**, determine whether it is a local minimum, a local maximum, or a saddle point. (*Hint.* The second derivative test is always conclusive in this problem.)