

## 14.3: Tangent Planes and Differentials

### Calculus III

College of the Atlantic. Winter 2017

1. Let  $f(x, y) = x^2 + y^2$ .
  - (a) Find the equation of the plane that is tangent to  $f(x, y)$  at the point  $(1, 2)$ .
  - (b) Use the tangent plane to approximate  $f(1.9, 2.2)$  and compare it to the exact value.
  - (c) Is your approximation above or below the true value? Explain this geometrically.
2. Find the equation of the tangent plane to the surface  $z = x^3 - y^3$  at  $(x, y) = (2, 3)$ .
3. Find the differential of the function  $g(x, y) = y^2e^{-x}$  at  $(x, y) = 1, 2$ .
4. Find the differential of the function  $P(\rho, v) = k\rho v^3$ , where  $k$  is a constant.