

## Math 213 Class 13: Gradient Fields and Level Curves

### Finding the Gradient Fields

The following vector fields are conservative. For each one, find a function  $f(x, y)$  or  $f(x, y, z)$  for which it is a gradient field.

1.  $\mathbf{F}(x, y) = 3xy^2 \mathbf{i} + 3x^2y \mathbf{j}$

2.  $\mathbf{F}(x, y) = y \sin(xy) \mathbf{i} + x \sin(xy) \mathbf{j}$

3.  $\mathbf{F}(x, y) = (2x + y) \mathbf{i} + (x + 3y^2) \mathbf{j}$

4.  $\mathbf{F}(x, y, z) = yze^{xyz} \mathbf{i} + xze^{xyz} \mathbf{j} + xye^{xyz} \mathbf{k}$