

## Identifying Gradient Fields and Exact Differentials

1. Determine whether each of the vector fields below is conservative.

a)  $\mathbf{F} = \langle xe^x + y, x \rangle$

b)  $\mathbf{F} = \langle xe^x + y, x + 2 \rangle$

c)  $\mathbf{F} = \langle xe^x + y + x, x \rangle$

2. Show  $(xe^x + y) dx + x dy$  is exact.

3. Compute the two dimensional curl of  $\mathbf{F}$  for each of the vector fields below.

a)  $\mathbf{F} = \langle x, xe^x + y \rangle$

b)  $\mathbf{F} = \mathbf{i} + \mathbf{j}$

c)  $\mathbf{F} = \langle xy^2, x^2y \rangle$

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