# Math 32B Week 5 Worksheet

Written by Victoria Kala

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1. Evaluate $\iint_R x^2 dA$ where $R$ is the region bounded by the ellipse $9x^2 + 4y^2 = 36$. Use the transformation $x = 2u, y = 3v$.

2. Determine whether or not the following vector fields are conservative:

   (a) $\mathbf{F}(x, y) = (x - y)\mathbf{i} + (x - 2)\mathbf{j}$

   (b) $\mathbf{F}(x, y) = \langle 3 + 2xy, x^2 - 3y^2 \rangle$

3. Let $\mathbf{F}(x, y, z) = y^2\mathbf{i} + (2xy + e^{3z})\mathbf{j} + 3ye^{3z}\mathbf{k}$.

   (a) Show that $\mathbf{F}$ is conservative.

   (b) Find a function $f$ such that $\nabla f = F$.