Homework 7
EE 381 Electric & Magnetic Fields (Fall 2026)
Wednesday, October 7, 2026

1) 3.33 First, sketch region. Assume $\overline{D}$ has units of donuts.
2) For the vector field $\overline{T} = 3yz\,\hat{a}_x - 6x^2z\,\hat{a}_y + 9xy\,\hat{a}_z$ (tulips/m), compute the divergence and curl. Draw path *L*, bounding the region $0 < x < 3$ m, $-2 < y < 4$ m, and $z = 2$ m, going in the CCW direction when viewed from above (i.e., $z > 2$ m). Then, directly calculate the circulation of $\overline{T}$ around path *L*. Confirm answer for circulation using Stoke's theorem.
3) 3.56
4) For each of the following vector fields, determine if they are solenoidal, irrotational, and/or conservative. In each case, show why or why not.
   a) $\overline{A} = 3y(x^2 - 2z)\,\hat{a}_x + x(x^2 - 6z)\,\hat{a}_y - 6xy\,\hat{a}_z$ (apples/m)
   b) $\overline{B} = 3\rho^2 \sin\phi\,\hat{a}_\rho + 3z\cos\phi\,\hat{a}_\phi - 6\rho z\,\hat{a}_z$ (bars/m)
   c) $\overline{C} = \dfrac{10\cos\theta}{r\sin\theta}\,\hat{a}_r + \dfrac{10}{r}\,\hat{a}_\theta$ (caves/m)

Due Wednesday, October 14, 2026.

Note: Unless otherwise specified assume units of meters for distances, lengths, and/or positions.