EE331 — Homework #8 / Due Wednesday, Mar. 11, 2020, **at the beginning of class**

1. Do Example #14 but with $\mathbf{A} = 2xyz\hat{\mathbf{a}}_x + x^2z\hat{\mathbf{a}}_y + x^2y\hat{\mathbf{a}}_z$.

2. Find the net outward flux through a cylinder with a height of 3 m and a radius of 2 m whose bottom is centered at the origin in the xy-plane if $\mathbf{B} = \rho^2\hat{\mathbf{a}}_\rho + 2z\hat{\mathbf{a}}_\phi + \cos\phi\hat{\mathbf{a}}_z$.

3. A spherical shell of charge in free space has a volume charge density of 0 for $0 \leq r < 2$ m and $2/r^2$ nC/m^3 for $2 \leq r \leq 4$ m, and 0 for $r > 4$ m. Find the total charge enclosed in the shell.

4. Determine the gradient of (a) $T = e^{x+2y}\cosh z$ and (b) $U = \dfrac{3z}{\rho}\cos\phi$.

5. Ch. 3, Prob. 3.38.

6. (a) Ch. 3, Prob. 3.45. (b) Also, verify Stokes's theorem by finding:

$$\int_S (\nabla \times \mathbf{A}) \cdot \mathbf{ds}$$

where S is the open surface defined by the closed contour L and $\mathbf{A}$ is as given in part (a). Note that the positive direction of the normal to the surface is given by the right-hand rule. Put the fingers of your right hand in the direction of the arrows, and your thumb will point in the positive direction.

7. Ch. 3, Prob. 3.56(a).