

Math 2415

Paper Homework #11

1. 15.7, Triple Integrals in Cylindrical Coordinates

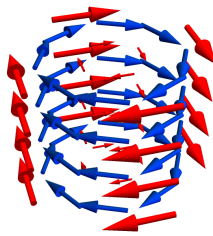
- (a) Sketch the solid region, E , in the first octant that is bounded by the cylinder $y^2 + z^2 = 16$ and the plane $x + y = 4$. Use a triple integral in cylindrical coordinates to find $\iiint_E \sqrt{y^2 + z^2} dV$.
- (b) Find $\iiint_E (x^2 + y^2) dV$ where E is the solid region above the xy -plane, below the paraboloid $z = 8 - x^2 - y^2$ and *outside* the cylinder $x^2 + y^2 = 1$. Sketch the solid E .

2. 15.8, Triple Integrals in Spherical Coordinates

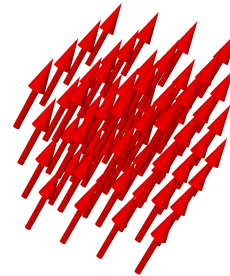
- (a) Evaluate the integral $\iiint_E z dV$, where E is the solid bounded by the spheres $x^2 + y^2 + z^2 = 1$ and $x^2 + y^2 + z^2 = 4$ in the first octant.
- (b) Find the volume of the region inside the ball $x^2 + y^2 + z^2 \leq R^2$ that lies between the cones $z = \sqrt{x^2 + y^2}$ and $z = \sqrt{3x^2 + 3y^2}$.

3. 16.1, Vector Fields

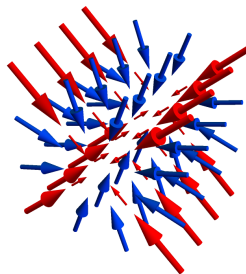
- (a) Match the vector fields \mathbf{F} with the plots labeled A-D. Briefly explain your reasoning.
- i. $\mathbf{F}(x, y, z) = x\mathbf{i} + 2y\mathbf{j} + 3z\mathbf{k}$
 - ii. $\mathbf{F}(x, y, z) = y\mathbf{i} - x\mathbf{j}$
 - iii. $\mathbf{F}(x, y, z) = \mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$
 - iv. $\mathbf{F}(x, y, z) = -x\mathbf{i} - z\mathbf{k}$



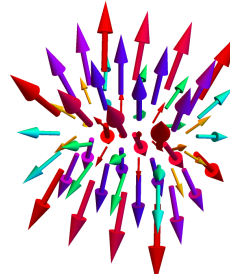
A



B



C



D