

**Math 13 Worksheet #18: Divergence Thm**

- (1) Verify the conclusion of the Divergence Theorem for the vector field  $\mathbf{F}(x, y, z) = \langle x^2, y^2, z^2 \rangle$  with the region  $R$  the unit ball centered at the origin.

- (2) Evaluate the integral  $\iint_S \mathbf{F}(x, y, z) \cdot \mathbf{n} dS$  for  $\mathbf{F}(x, y, z) = \langle xz, yz, xyz \rangle$  and  $S$  is the surface of the cylinder with equation  $x^2 + y^2 = 9$  for  $-2 \leq z \leq 2$  and  $\mathbf{n}$  being the outward pointing normal vector.

- (3) Evaluate the integral  $\iint_S \mathbf{F}(x, y, z) \cdot \mathbf{n} dS$  for  $\mathbf{F}(x, y, z) = \langle \sin y \cos z, yz^2, zx^2 \rangle$  and  $S$  is the surface of the region bounded by the paraboloid  $y = x^2 + z^2$  and the planes  $y = 1$  and  $y = 4$  and  $\mathbf{n}$  being the outward pointing normal vector.