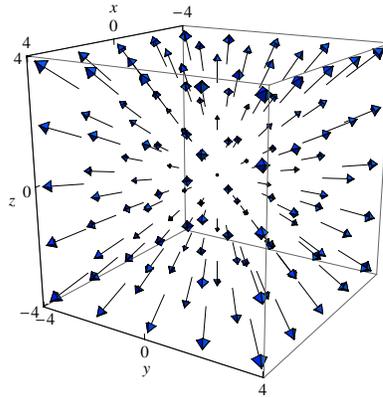


1 Let $\mathbf{F}(x, y, z) = \langle x, y, z \rangle$ (pictured below).



In each part, you are given an oriented surface S . Without computing, decide whether the flux integral $\iint_S \mathbf{F} \cdot d\mathbf{S}$ is positive, negative, or zero. Explain your reasoning. (You may of course compute the flux integral to check your answer!)

- S is the ellipsoid $x^2 + 4y^2 + 9z^2 = 16$, oriented with normals pointing outward.
- S is the part of the plane $y = 1$ with $-1 \leq x \leq 1$ and $-1 \leq z \leq 1$, oriented with normals pointing in the direction of the positive y -axis.
- S is the part of the plane $y = -1$ with $-1 \leq x \leq 1$ and $-1 \leq z \leq 1$, oriented with normals pointing in the direction of the positive y -axis.
- S is the part of the paraboloid $z = x^2 + y^2 - 1$ under the plane $z = 3$, oriented with normals pointing upward.