Vector Fields
Scalar and Vector Fields

Question
Describe the streamlines of the following velocity field.
$$\underline{v}(x, y, z) = x\underline{i} + y\underline{j} - x\underline{k}$$
Answer
The streamlines satisfy $\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{x}$. Thus $z + x = C_1$, $y = C_2 x$.
The streamlines are straight half-lines emanating from the z-axis and are perpendicular to the vector $\underline{i} + \underline{k}$.