

**Added Exercises: Answers**

Consider a scalar field  $f(\mathbf{x})$ , a vector field  $\mathbf{v}(\mathbf{x})$ , and a second order tensor field  $\mathbf{T}(\mathbf{x})$ . For each of the expressions below, write its indicial form.

1.  $\nabla(\mathbf{T} \cdot \mathbf{v})$
2.  $\nabla^2 \mathbf{T}$
3.  $\nabla \cdot (f\mathbf{v})$
4.  $\nabla \times \nabla \times \mathbf{T}$
5.  $\nabla^2(\nabla \times \mathbf{v})$
6.  $\nabla^4 f$
7.  $\nabla(\mathbf{x}\mathbf{v})$
8.  $\nabla \cdot (\mathbf{x} \cdot \mathbf{T})$
9.  $\nabla \cdot \mathbf{x}$
10.  $\nabla \cdot (\mathbf{v}\mathbf{x})$
11.  $\nabla \cdot [(\nabla \cdot \mathbf{v})\mathbf{x}\mathbf{x}]$
12.  $\nabla \times (f\mathbf{v})$
13.  $\nabla(\mathbf{T} \cdot \mathbf{T}^T)$