From Griffiths: 1.4 - $\frac{1}{7}(6\hat{x} + 3\hat{y} + 2\hat{z})$
1.7 - $\hat{r} = \frac{1}{3}(tx - 2\hat{y} + \hat{z}$ 1.19, 1.28.

1. Prove that $(\mathbf{A} \times \mathbf{B}) \cdot (\mathbf{C} \times \mathbf{D}) = (\mathbf{A} \cdot \mathbf{C})(\mathbf{B} \cdot \mathbf{D}) - (\mathbf{A} \cdot \mathbf{D})(\mathbf{B} \cdot \mathbf{C})$

2. Problem 1.12 with new function: $h(x, y) = 15(4x^2 - 4xy + 3y^2 + 16x - 29y - 11)$

3. Let $\mathbf{r} = x\hat{\mathbf{i}} + y\hat{\mathbf{j}} + z\hat{\mathbf{k}}$ and $r = |\mathbf{r}|$. Prove $\mathbf{A} \cdot \nabla\left(\frac{1}{r}\right) = -\frac{\mathbf{A} \cdot \mathbf{r}}{r^3}$

4. (a) Sketch a picture of the vector field $\mathbf{F}(\mathbf{r}) = \mathbf{r}$.
   (b) Calculate directly the flux of $\mathbf{F}(\mathbf{r})$ outward through the surface of the unit cube defined by $0 \leq x, y, z \leq 1$.
   (c) Calculate the flux using Gauss's theorem.