Fysiikan matematiikka: Harjoitus 13

1. a) $\nabla f(1, -1, 1) = -\hat{\mathbf{i}} - \hat{\mathbf{j}} + 3\hat{\mathbf{k}}$,
   $\mathbf{T} = (1 - 10t)\hat{\mathbf{i}} + (-1 + 3s + t)\hat{\mathbf{j}} + (1 + s - 3t)\hat{\mathbf{k}}$ tai
   $-x - y + 3z = 3$
   b) $\nabla f(1, -1, 1) = \hat{\mathbf{i}} + 2\hat{\mathbf{j}} + 3\hat{\mathbf{k}}$,
   $\mathbf{T} = (\frac{\pi}{2} + 2t - 3s)\hat{\mathbf{i}} + (\pi - 10t)\hat{\mathbf{j}} + (\pi + 6t + s)\hat{\mathbf{k}}$ tai
   $x + 2y + 3z = \frac{11\pi}{2}$

2. a) $\nabla r = \frac{\mathbf{r}}{r}$

3. 0

4. a) $4xz - 2xyz + 6yz$ b)$6r^3$ c) $\frac{3}{r^4}$