

Exercise 9

If \mathbf{r} is the position vector and r is its magnitude, verify that

$$(a) \quad \nabla \frac{1}{r} = -\frac{\mathbf{r}}{r^3} \quad (c) \quad \nabla(\mathbf{a} \cdot \mathbf{r}) = \mathbf{a} \quad \text{if } \mathbf{a} \text{ is a constant vector}$$

$$(b) \quad \nabla f(r) = \frac{1}{r} \frac{df}{dr} \mathbf{r}$$