# 1. Gyak.
## vektor-vektor fv-ek, diff. operátorok

1. $\underline{v}(\underline{x}) := \underline{v}(x,y,z) = x^2yz\underline{i} - \frac{2x\sqrt{z}}{y^2}\underline{j}, \underline{x}_0 = (-1,1,4)^\top, \tilde{\underline{x}} := (-0.99; 1.02; 3.9)^\top$
   (a) $\underline{\underline{J}}_{\underline{v}}(\underline{x}) =?$
   (b) Adjon közelítést $\tilde{\underline{x}}$-ra a teljes differenciál segítségével!
2. $f(x,y,z) := 2x^2y - \frac{y^2x}{z^2}, \underline{x}_0 := (1,-1,1)^\top$
   (a) $\operatorname{grad} f =?, (\operatorname{grad} f)(\underline{x}_0) =?$
   (b) $\triangle f =?, (\triangle f)(\underline{x}_0) =?$
3. $\underline{v}(\underline{x}) = (3x^3y; -y^2z; z^2yx)^\top, \underline{x}_0 = (1,1,1)$
   (a) $\operatorname{div} \underline{v} =?, (\operatorname{div} \underline{v})(\underline{x}_0) =?$
   (b) $\operatorname{rot} \underline{v} =?, (\operatorname{rot} \underline{v})(\underline{x}_0) =?$
   (c) $\underline{\triangle}\underline{v} =?, (\underline{\triangle}\underline{v})(\underline{x}_0) =?$
4. $f(\underline{x}) := 3y^2x + \frac{z^3}{\sqrt{x}}, \underline{v}(\underline{x}) := \underline{x} \cdot |\underline{x}|^2$
   (a) $\operatorname{div}\operatorname{grad} f =?$
   (b) $\operatorname{rot}\operatorname{grad} f =?$
   (c) $\operatorname{div}\operatorname{rot} \underline{v} =?$
   (d) $\operatorname{rot}\operatorname{rot} \underline{v} =?$
5. $\underline{a} = (1,2,3)^\top, \underline{v}(\underline{x}) := 2\underline{a} \times \underline{x}$
   (a) $\underline{\underline{J}}_{\underline{v}}(\underline{x}) =?$
   (b) $\operatorname{div} \underline{v} =?$
   (c) $\operatorname{rot} \underline{v} =?$