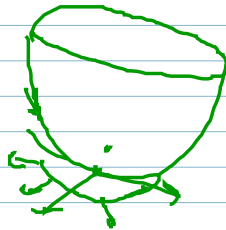
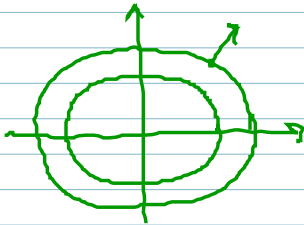


Gradientvektor og ligning for tangentplan til
overflade

$$f(x, y, z)$$
$$\nabla f(x, y, z) = \begin{bmatrix} \frac{\partial f}{\partial x}(x, y, z) \\ \frac{\partial f}{\partial y}(x, y, z) \\ \frac{\partial f}{\partial z}(x, y, z) \end{bmatrix}$$

$$g(x, y) = 2x^2 + 3y^2$$
$$\nabla g(x, y) = \begin{bmatrix} 4x \\ 6y \end{bmatrix}$$



$$f(x, y, z) = x^2 + y^2 - z^2$$

$$\nabla f(x, y, z) = \begin{bmatrix} 2x \\ 2y \\ -2z \end{bmatrix}$$

$$\nabla f(1, -1, 1) = \begin{bmatrix} 2 \\ -2 \\ -2 \end{bmatrix}$$

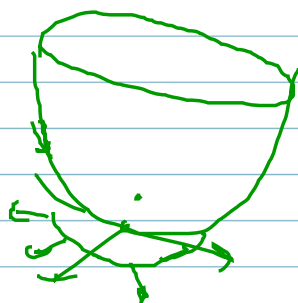
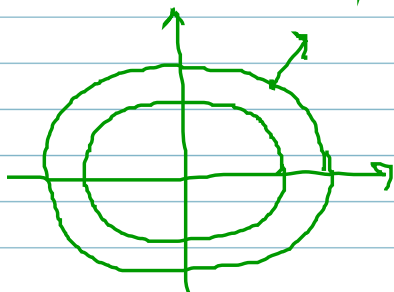
Gradientvektor og ligning for tangentplan til
niveauflade

$$f(x, y, z)$$

$$\nabla f(x, y, z) = \begin{bmatrix} \frac{\partial f}{\partial x}(x, y, z) \\ \frac{\partial f}{\partial y}(x, y, z) \\ \frac{\partial f}{\partial z}(x, y, z) \end{bmatrix}$$

$$g(x, y) = 2x^2 + 3y^2$$

$$\nabla g(x, y) = \begin{bmatrix} 4x \\ 6y \end{bmatrix}$$



$$f(x, y, z) = x^2 + y^2 - z^2$$

$$\nabla f(x, y, z) = \begin{bmatrix} 2x \\ 2y \\ -2z \end{bmatrix}$$

$$\nabla f(1, -1, 1) = \begin{bmatrix} 2 \\ -2 \\ -2 \end{bmatrix}$$

$$\nabla F(\underbrace{1, -1, 1}_{P_0}) = \begin{bmatrix} 2 \\ -2 \\ -2 \end{bmatrix}$$

$$F(x, y, z) = x^2 + y^2 - z^2$$

$$F(x, y, z) = 1$$



$\nabla F(P_0)$ vinkelret på tangentplanen til
niveaufladen

Ligning for tangentplan

$$\underline{n} \cdot (P - P_0) = 0$$

$$\nabla F(P_0) \cdot (P - P_0) = 0$$

$$P = (x, y, z)$$

$$\begin{bmatrix} 2 \\ -2 \\ -2 \end{bmatrix} \cdot \begin{bmatrix} x-1 \\ y-(-1) \\ z-1 \end{bmatrix} = 0$$

$$2(x-1) - 2(y+1) - 2(z-1) = 0$$