Άσκηση 2

$$p(x) = N(x; \mu_1, \sigma_1^2) = \frac{1}{\sqrt{2\pi}\sigma_1} \cdot e^{-\frac{(x-\mu_1)^2}{2\sigma_1^2}}$$

$$p(y) = N(y; \mu_2, \sigma_2^2) = \frac{1}{\sqrt{2\pi}\sigma_2} \cdot e^{-\frac{(y-\mu_2)^2}{2\sigma_2^2}}$$

x, y ανεξάρτητα άρα $p(x,y) = p(x) \cdot p(y) =$

$$= \frac{1}{\sqrt{2\pi}\cdot\sigma_1} \cdot e^{-\frac{(x-\mu_1)^2}{2\sigma_1^2}} \cdot \frac{1}{\sqrt{2\pi}\cdot\sigma_2} \cdot e^{-\frac{(y-\mu_2)^2}{2\sigma_2^2}} =$$

$$= \frac{1}{2\pi\sigma_1\sigma_2} \cdot e^{-\frac{(x-\mu_1)^2}{2\sigma_1^2} - \frac{(y-\mu_2)^2}{2\sigma_2^2}} = N(x,y;\mu,\Sigma)$$

$$\mu = \begin{pmatrix} \mu_1 \\ \mu_1 \end{pmatrix}, \quad \Sigma = \begin{pmatrix} \sigma_1^2 & 0 \\ 0 & \sigma_2^2 \end{pmatrix}$$