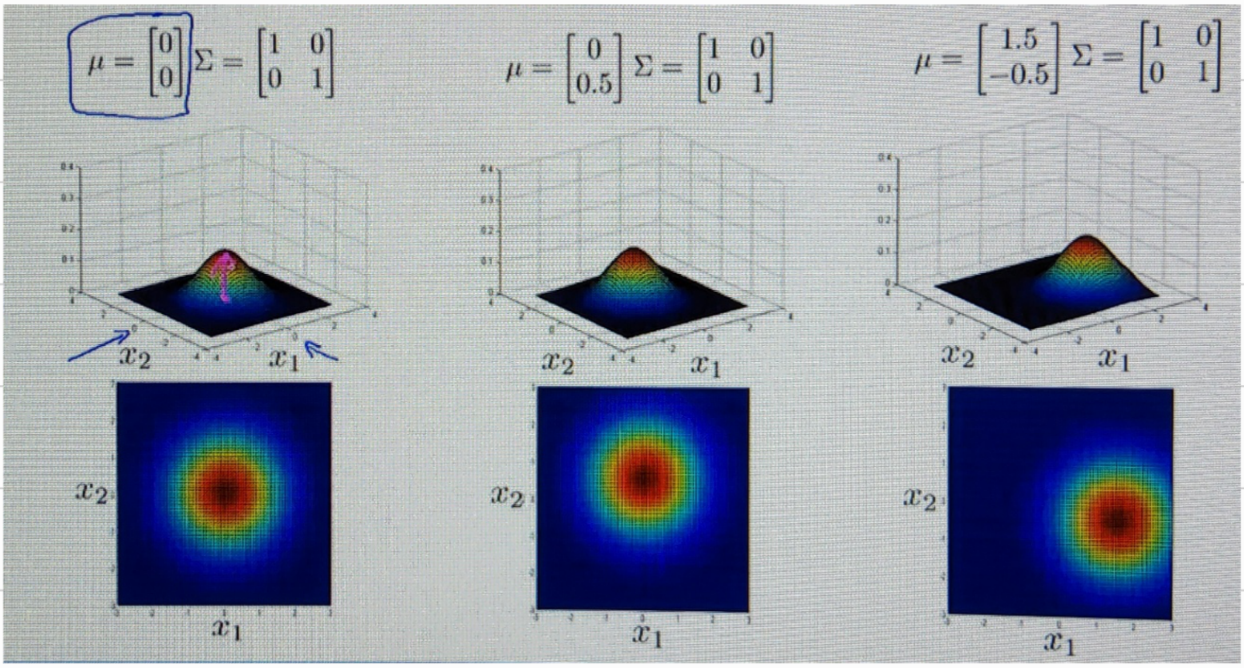
Multivariate Gaussian Distribution

$x \in \mathbb{R}^n$ $p(x)$를 $p(x_1) \cdot p(x_2) \cdot \cdots$ 가 아니라

All in one go로 구하기

$\mu \in \mathbb{R}^n$, $\Sigma \in \mathbb{R}^{n \times n}$



Anomaly Detection using the Multivariate Gaussian Distribution

$\mu = \frac{1}{m} \sum_{i=1}^{m} x^{(i)}$

$\Sigma = \frac{1}{m} \sum_{i=1}^{m} (x^{(i)} - \mu)(x^{(i)} - \mu)^T$

1. Fit model $p(x)$ by setting

2. Given a new example x, compute

$$p(x) = \frac{1}{(2\pi)^{\frac{n}{2}} |\Sigma|^{\frac{1}{2}}} \exp\left(-\frac{1}{2}(x-\mu)^T \Sigma^{-1} (x-\mu)\right)$$

Flag an anomaly if $p(x) < \varepsilon$

Original model	vs.	Multivariate Gaussian
- Manually create features to capture anomalies where x_1, x_2 take unusual comb. of values		+ Automatically captures correlations btw. features
+ Computationally cheaper		- Computationally more expensive
+ OK even if m is small		- Must have $m > n$, or else Σ is non-invertible