가우시안 함수 (Gaussian Function)

전산천문학 오승준

http://en.wikipedia.org/wiki/Gaussian_function

Carl Frederick Gauss

- **April 30, 1777 - February 23, 1855**
  Born: Brunswick, Germany
  Died: Göttingen, Germany

- 다양한 분야의 업적 **:** 수학**,** 천문학**,** 광학**,** 측지학**,** 수치해석**,** 수 이론**,** 미분 기하

- 태어날 때 부터 신동으로서 다양한 분야에 혁혁한 업적을 남김

- **http://www.ce.memphis.edu/1112/FAQs/gauss.htm**

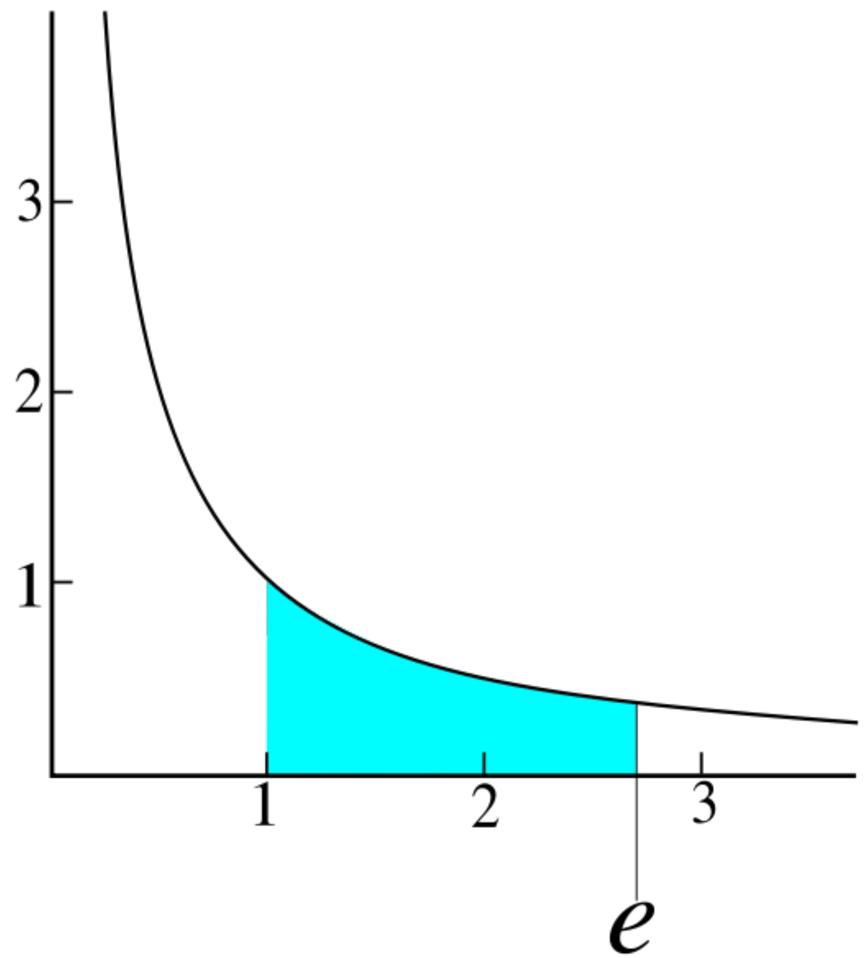
가우스 함수 (Gaussian Function)

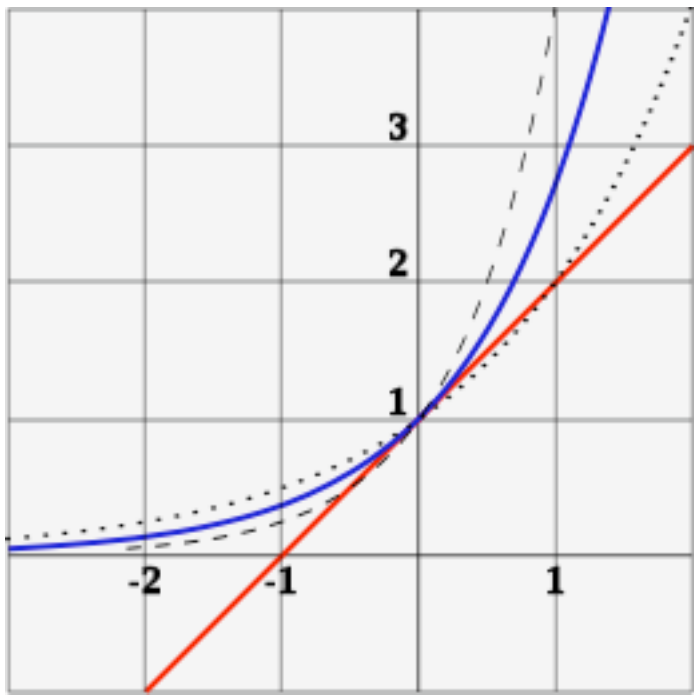
$$f(x) = ae^{-\frac{(x-b)^2}{2c^2}}$$

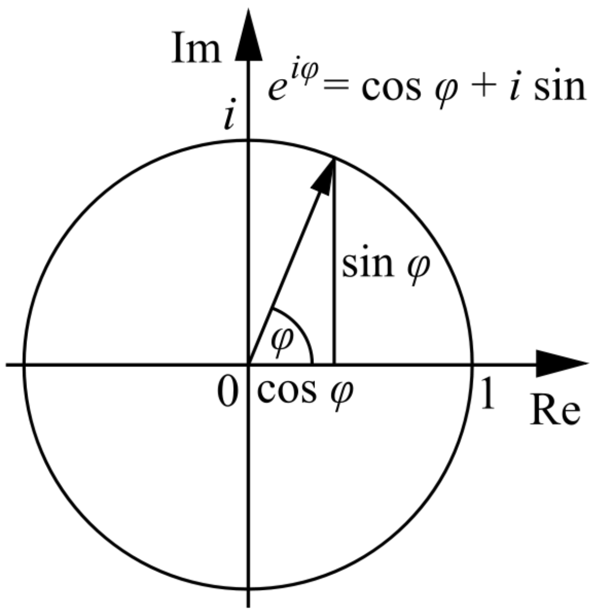
a > 0, b , c >0, e=2.718281828….(Euler’s number)
a : 곡선의 최대값, b : 최대값을 가지는 x 좌표,
c : 곡선의 폭 결정

Euler’s number?

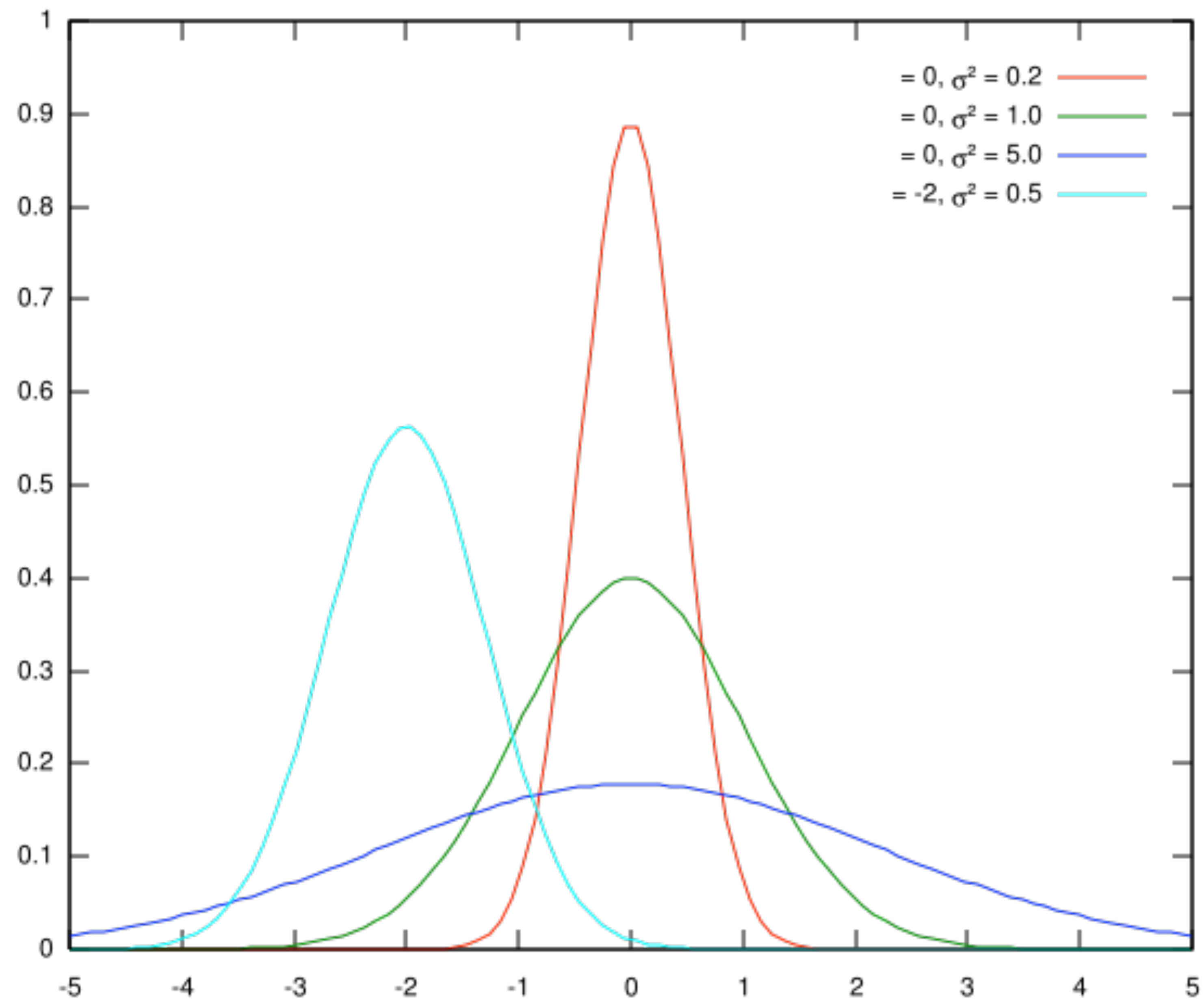
e (exponential; Euler's number)







가우스함수의 형태



= 0, σ² = 0.2
= 0, σ² = 1.0
= 0, σ² = 5.0
= -2, σ² = 0.5
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-5
-4
-3
-2
-1
0
1
2
3
4
5

가우스함수의 특성

$$\mathrm{FWHM} = 2\sqrt{2\ln 2}\; c = 2.35482\ldots \cdot c.$$

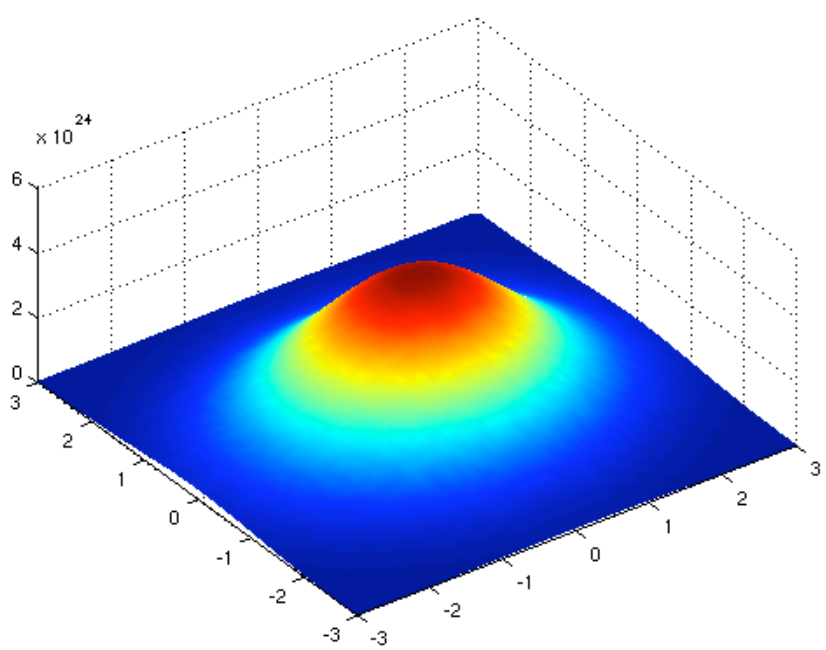
$x \to \pm\infty$ f(x) -> 0

$$\int_{-\infty}^{\infty} e^{-x^2}\, dx = \sqrt{\pi}$$: Gaussian Integral

$$\int_{-\infty}^{\infty} ae^{-\frac{(x-b)^2}{2c^2}}\, dx = ac \cdot \sqrt{2\pi}.$$ =1 if a=1/2*sqrt(2pi)

2차원 가우스함수

$$f(x,y) = Ae^{-\left(\frac{(x-x_o)^2}{2\sigma_x^2}+\frac{(y-y_o)^2}{2\sigma_y^2}\right)}.$$



정규분포(Normal distribution)

$$X \sim N(\mu, \sigma^2).$$

$$p(x) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right),$$

$$p(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}x^2},$$

To Be Continued....!!