2018.05.28-MON

노트북:	SW		
만든 날짜:	2018-05-28 오전 11:49	**수정한 날짜:**	2018-05-28 오전 10:48
작성자:	정상요		

2018. 5. 28 월 – 62회차

과정 : TI, DSP, Xilinx Znq FPGA, MCU 기반의 프로그래밍 전문가 과정

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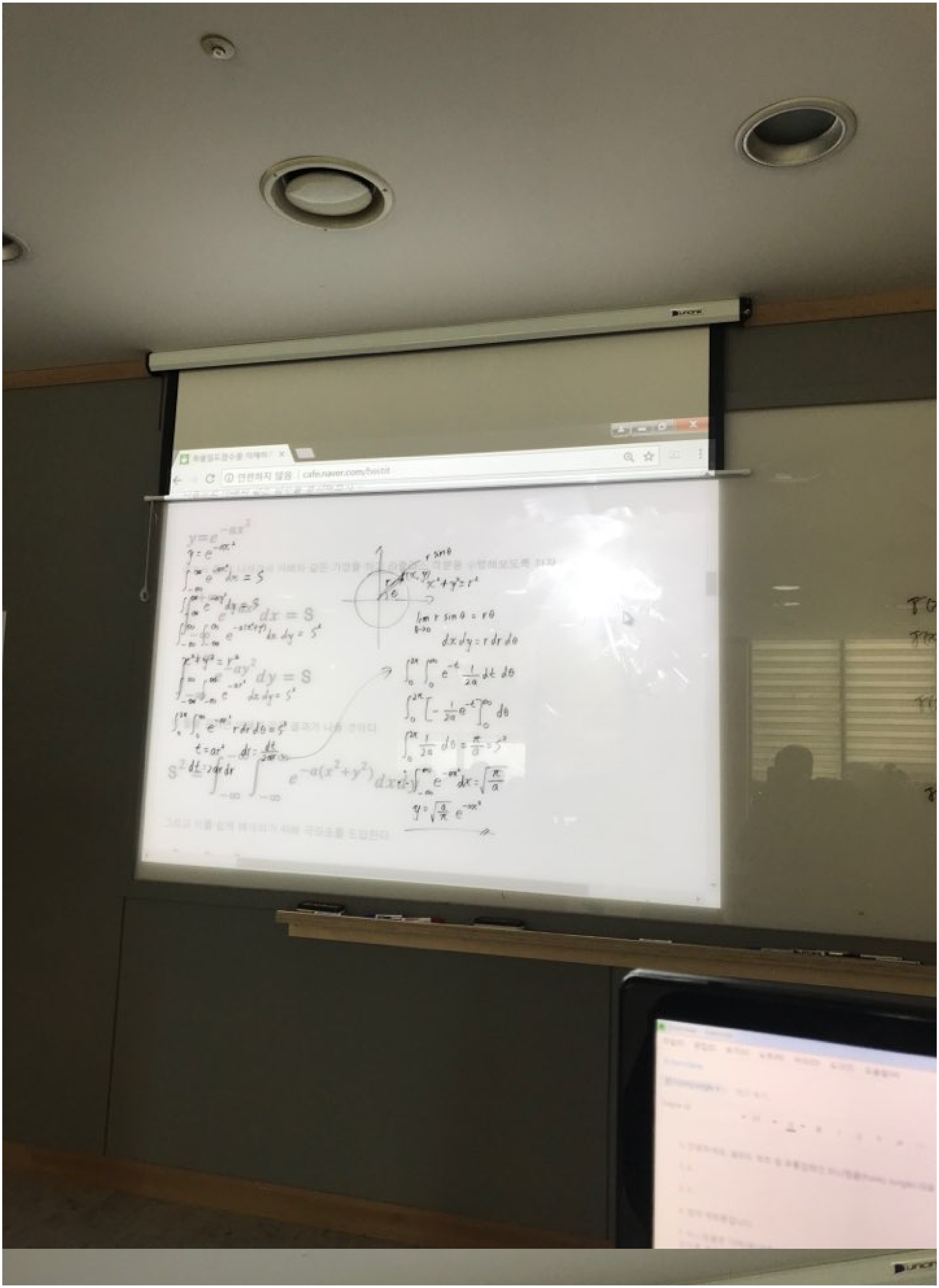
- 감마함수 : 공부
- 칼만필터 : 공부(감마함수 이용해서 계산)



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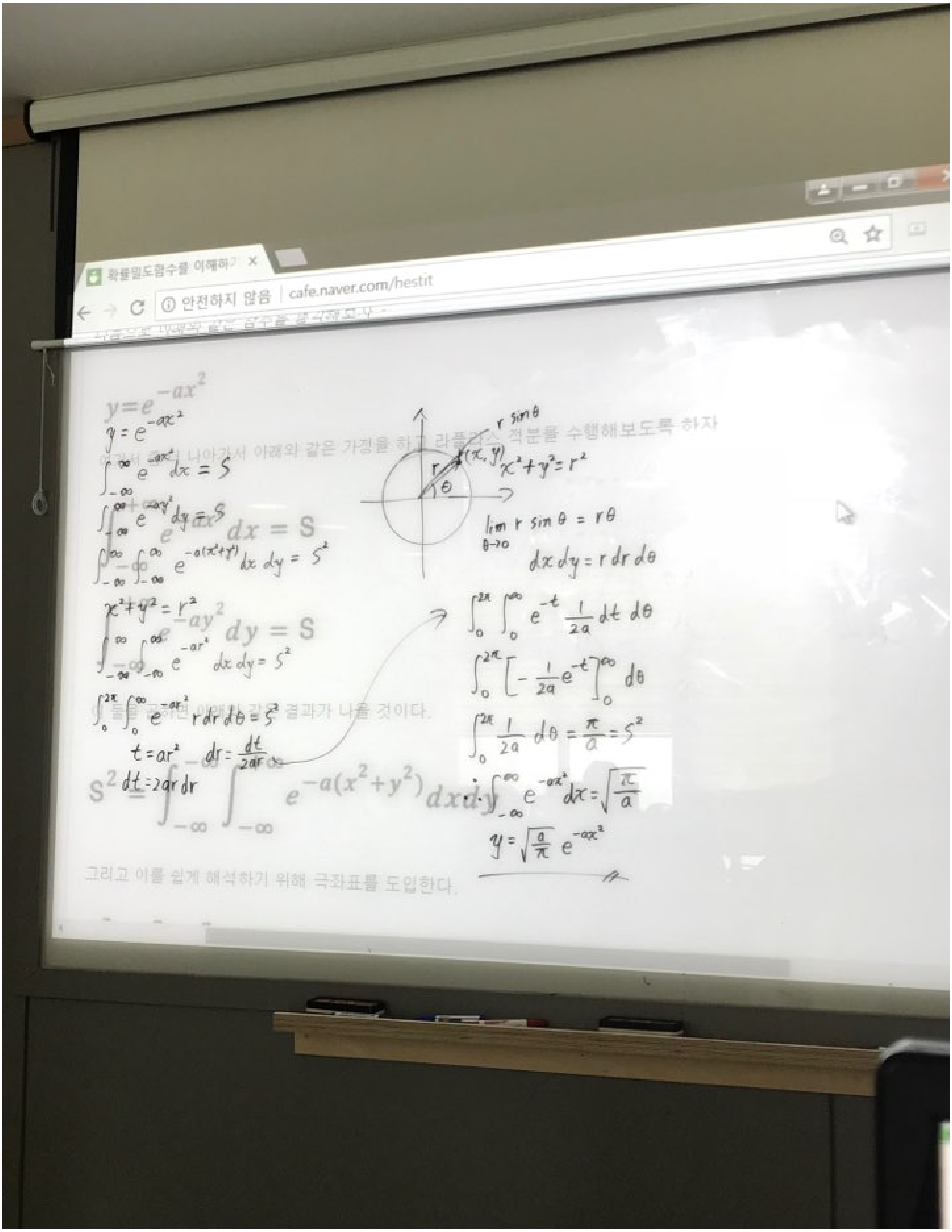
y=e^{-ax^2}
dx = S
dy = S
dxdy = r dr dθ


확률밀도함수를 이해하기
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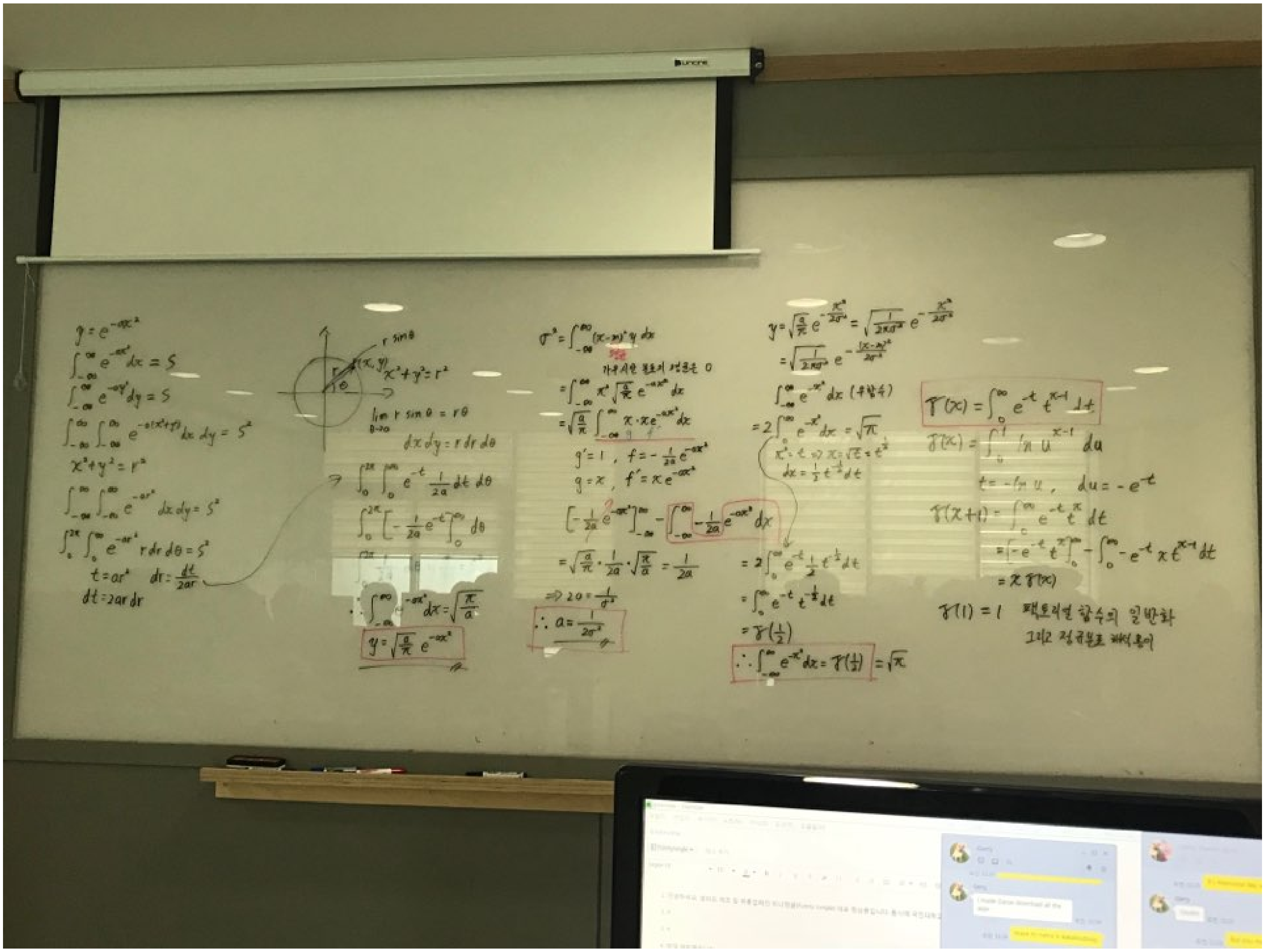
$y=e^{-ax^2}$
라플라스 적분을 수행해보도록 하자
$\int e^{-ax^2}dx = S$
$\int e^{-ay^2}dy = S$
아래와 같은 결과가 나올 것이다.
$S^2 = \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-a(x^2+y^2)}dxdy$
그리고 이를 쉽게 해석하기 위해 극좌표를 도입한다.
$y = e^{-ax^2}$
$\int_{-\infty}^{\infty} e^{-ax^2}dx = S$
$\int_{-\infty}^{\infty} e^{-ay^2}dy = S$
$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-a(x^2+y^2)}dx\,dy = S^2$
$x^2+y^2=r^2$
$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-ar^2}dx\,dy = S^2$
$\int_0^{2\pi}\int_0^{\infty} e^{-ar^2} r\,dr\,d\theta = S^2$
$t = ar^2 \quad dr = \frac{dt}{2ar}$
$dt = 2ar\,dr$
$r\sin\theta$
(x, y)
r
θ
$x^2+y^2=r^2$
$\lim_{\theta\to 0} r\sin\theta = r\theta$
$dx\,dy = r\,dr\,d\theta$
$\int_0^{2\pi}\int_0^{\infty} e^{-t}\frac{1}{2a}dt\,d\theta$
$\int_0^{2\pi}\left[-\frac{1}{2a}e^{-t}\right]_0^{\infty}d\theta$
$\int_0^{2\pi}\frac{1}{2a}d\theta = \frac{\pi}{a} = S^2$
$\therefore \int_{-\infty}^{\infty} e^{-ax^2}dx = \sqrt{\frac{\pi}{a}}$
$y = \sqrt{\frac{a}{\pi}}e^{-ax^2}$



$y = e^{-ax^2}$
$\int_{-\infty}^{\infty} e^{-ax^2} dx = S$
$\int_{-\infty}^{\infty} e^{-ay^2} dy = S$
$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-a(x^2+y^2)} dx\,dy = S^2$
$x^2+y^2=r^2$
$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-ar^2} dx\,dy = S^2$
$\int_{0}^{2\pi}\int_{0}^{\infty} e^{-ar^2} r\,dr\,d\theta = S^2$
$t = ar^2 \quad dr = \frac{dt}{2ar}$
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(x, y)
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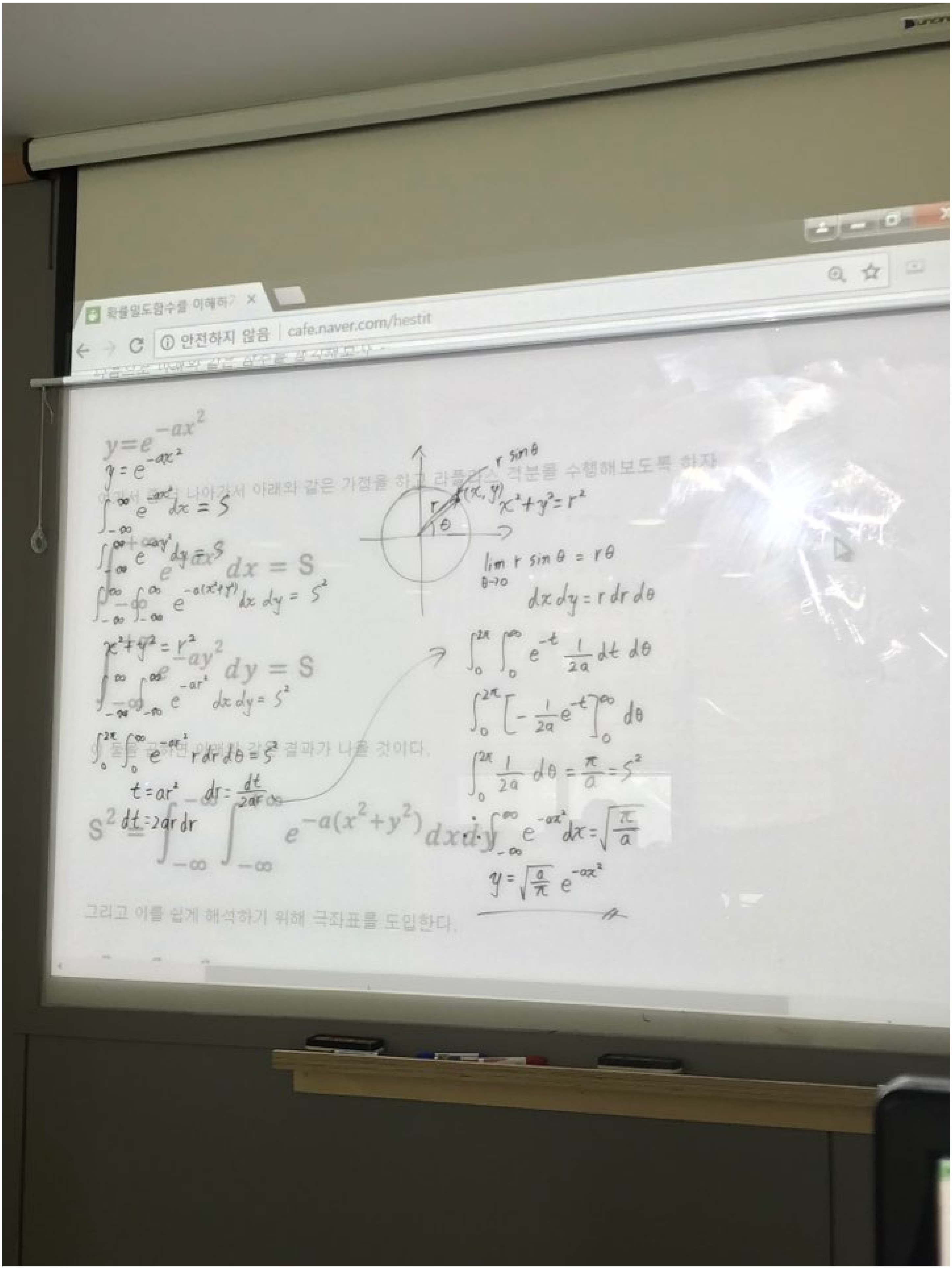
$dx\,dy = r\,dr\,d\theta$
$\int_0^{2\pi}\int_0^{\infty} e^{-t}\frac{1}{2a}dt\,d\theta$
$\int_0^{2\pi}\left[-\frac{1}{2a}e^{-t}\right]_0^{\infty} d\theta$
$\therefore \int_{-\infty}^{\infty} e^{-ax^2}dx = \sqrt{\frac{\pi}{a}}$
$y = \sqrt{\frac{a}{\pi}}\, e^{-ax^2}$
$\sigma^2 = \int_{-\infty}^{\infty}(x-m)^2 y\,dx$
$= \int_{-\infty}^{\infty} x^2\sqrt{\frac{a}{\pi}}\, e^{-ax^2}dx$
$= \sqrt{\frac{a}{\pi}}\int_{-\infty}^{\infty} x\cdot xe^{-ax^2}dx$
$g'=1, \quad f = -\frac{1}{2a}e^{-ax^2}$
$g = x, \quad f' = xe^{-ax^2}$
$\left[-\frac{1}{2a}e^{-ax^2}\right]_{-\infty}^{\infty} - \int_{-\infty}^{\infty} -\frac{1}{2a}e^{-ax^2}dx$
$= \sqrt{\frac{a}{\pi}}\cdot\frac{1}{2a}\cdot\sqrt{\frac{\pi}{a}} = \frac{1}{2a}$
$\Rightarrow 2a = \frac{1}{\sigma^2}$
$\therefore a = \frac{1}{2\sigma^2}$
$y = \sqrt{\frac{a}{\pi}}\, e^{-\frac{x^2}{2\sigma^2}} = \sqrt{\frac{1}{2\pi\sigma^2}}\, e^{-\frac{x^2}{2\sigma^2}}$
$= \sqrt{\frac{1}{2\pi\sigma^2}}\, e^{-\frac{(x-m)^2}{2\sigma^2}}$
$\int_{-\infty}^{\infty} e^{-x^2}dx$
$= 2\int_0^{\infty} e^{-x^2}dx = \sqrt{\pi}$
$x^2 = t \Rightarrow x = \sqrt{t} = t^{\frac{1}{2}}$
$dx = \frac{1}{2}t^{-\frac{1}{2}}dt$
$= 2\int_0^{\infty} e^{-t}\frac{1}{2}t^{-\frac{1}{2}}dt$
$= \int_0^{\infty} e^{-t}t^{-\frac{1}{2}}dt$
$= \Gamma\left(\frac{1}{2}\right)$
$\therefore \int_{-\infty}^{\infty} e^{-x^2}dx = \Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$
$\Gamma(x) = \int_0^{\infty} e^{-t}t^{x-1}dt$
$\Gamma(x) = \int_0^{1} \ln u^{x-1}\,du$
$t = -\ln u, \quad du = -e^{-t}$
$\Gamma(x+1) = \int_0^{\infty} e^{-t}t^{x}dt$
$= \left[-e^{-t}t^{x}\right]_0^{\infty} - \int_0^{\infty} -e^{-t}xt^{x-1}dt$
$= x\Gamma(x)$
$\Gamma(1) = 1$
팩토리얼 함수의 일반화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$\int_{-\infty}^{\infty} e^{-ax^2}dx = \sqrt{\frac{\pi}{a}}$
$y=\sqrt{\frac{a}{\pi}}e^{-ax^2}$
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