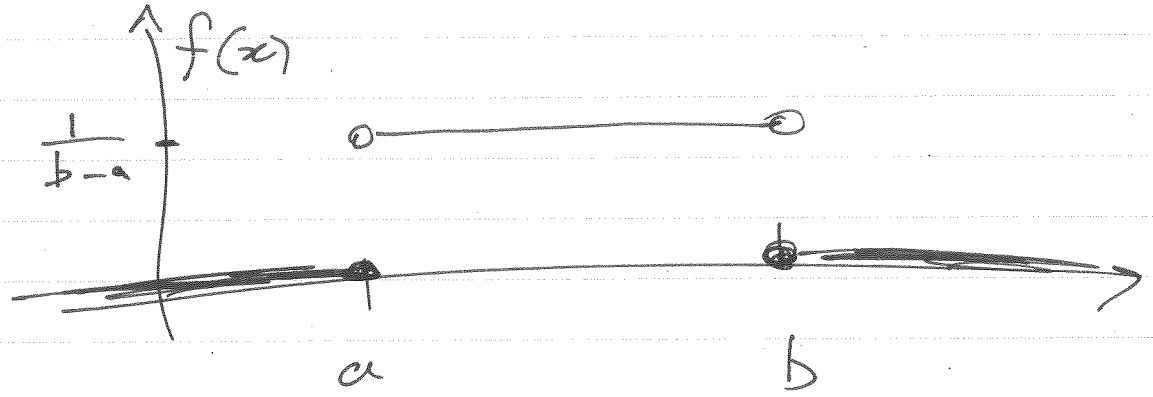
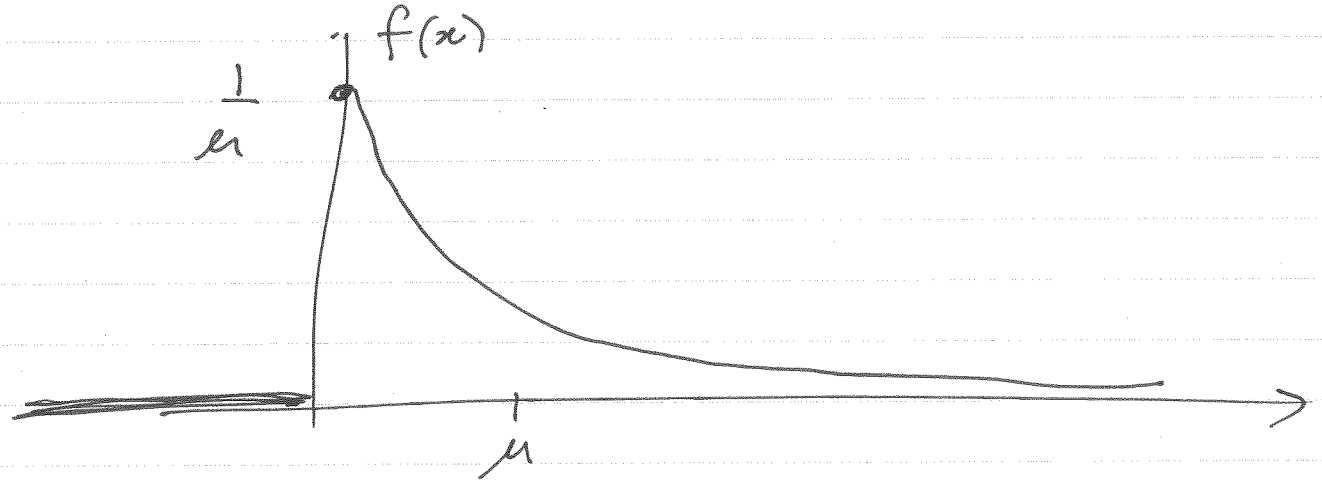
$$P(X \le x) = \int_{-\infty}^{x} f_X(t)\,dt$$

~~$f(x)\,dx$~~ Interpret $f_X(t)\,dt$

as

$$P(t < X \le t + dt)$$



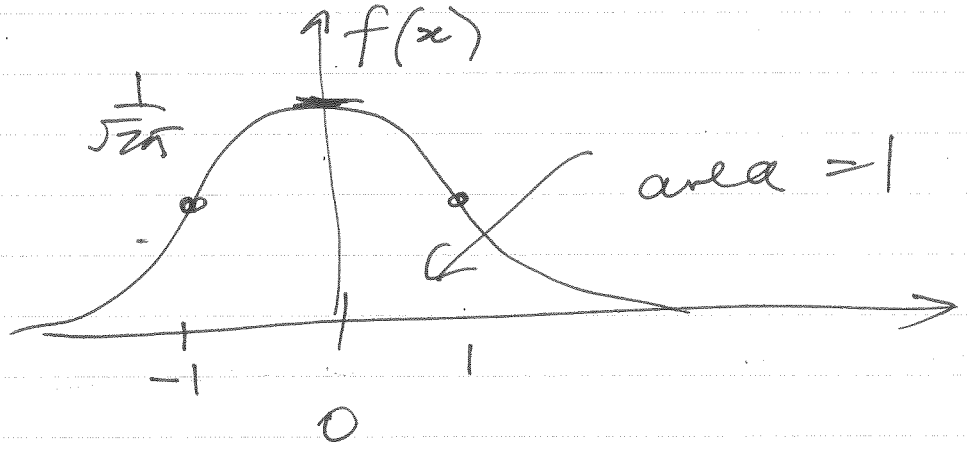


$$E(X) = \int_{-\infty}^{\infty} x \underbrace{f(x)\,dx}_{\updownarrow}$$

"$P(X \in (x, x+dx))$"

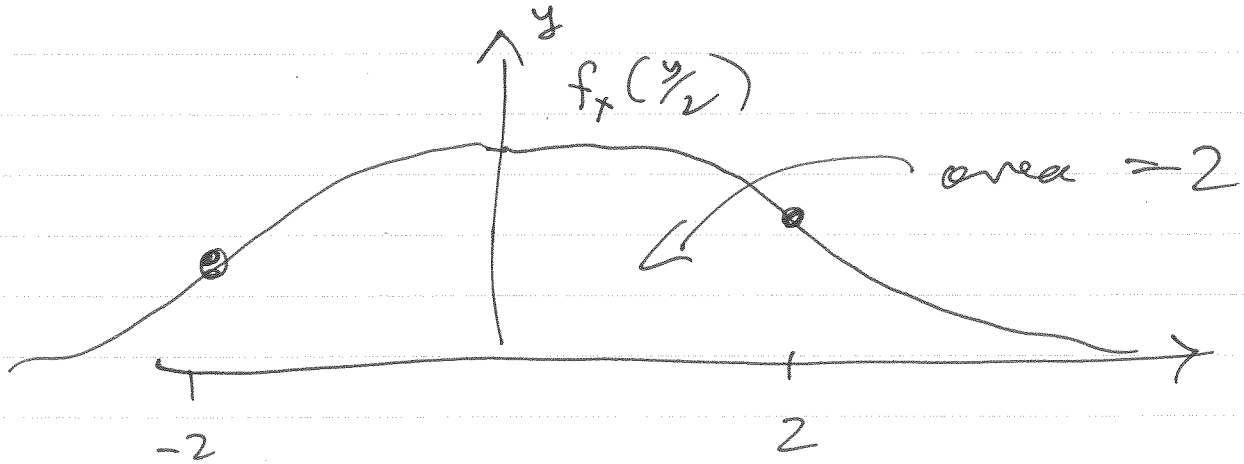
X discrete: $E[g(X)] = \sum_x g(x)\, P(X=x)$

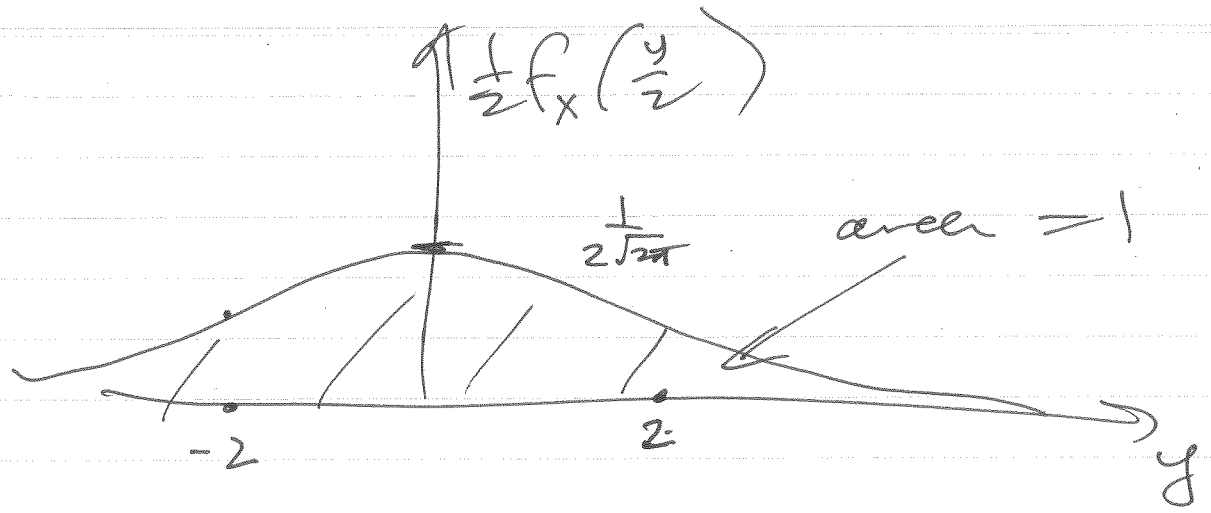
X cts : $E[g(X)] = \int_{-\infty}^{\infty} g(x) f_X(x)\, dx$



$Y = 2X$

$f_Y(y) = \frac{1}{2} f_X\left(\frac{y}{2}\right)$




$\frac{1}{2} f_X\left(\frac{y}{2}\right)$
$\frac{1}{2\sqrt{2\pi}}$
area $= 1$
-2
2
y