$$P(x) = A\, e^{-(x-\langle x\rangle)^2 B}$$

$$A e^{-bx^2}$$: Guassian

$$\frac{1}{2\pi\sigma^2} e^{-\frac{(x-\langle x\rangle)^2}{2\sigma^2}}$$

$$A = \frac{1}{2\pi\sigma^2}$$

$$b = \frac{1}{2\sigma^2}$$

$$\langle x\rangle = 0$$

$$\cancel{p(x) =} \qquad p(h_i) = \frac{n(h_i)}{\sum_i n(h_i)}$$

$$\sum_i p(h_i) = 1$$

$$P(x) = Ae^{-bx^2}$$

$$\int_{-\infty}^{\infty} P(x)\,dx = 1$$

$$\int_{-\infty}^{\infty} Ae^{-bx^2}\,dx = 1 \Rightarrow \boxed{A = \frac{1}{\int_{-\infty}^{\infty} e^{-bx^2}\,dx}}$$

$$\int_{-\infty}^{\infty} e^{-bx^2}\,dx = \sqrt{\frac{\pi}{b}}$$

$$A = \frac{1}{\sqrt{\pi/b}} = \sqrt{b/\pi}$$

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

$$\int_{-\infty}^{\infty} p(x)\, dx = 1$$

$$\langle x \rangle = \int_{-\infty}^{\infty} x \, P(x) \, dx$$

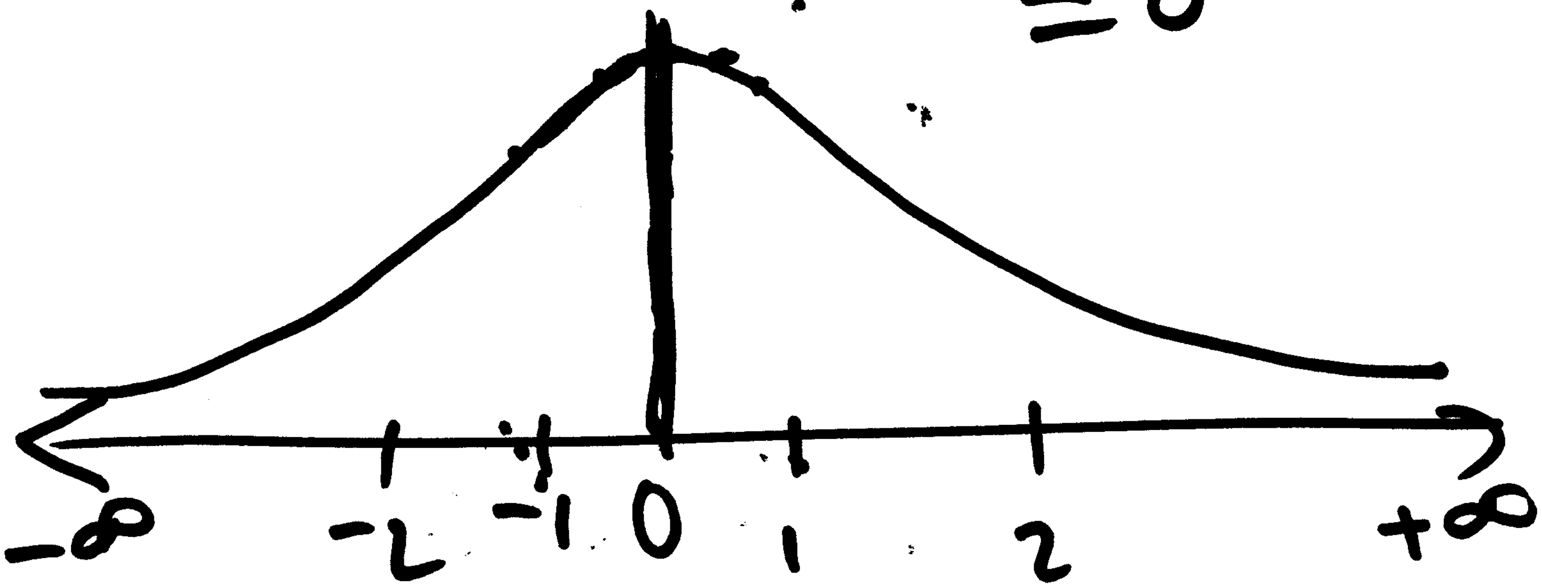
$$\langle x^2 \rangle = \int_{-\infty}^{\infty} x^2 \, P(x) \, dx$$

$$\sigma = \sqrt{\langle x^2 \rangle - \langle x \rangle^2}$$

$$P(x) = \sqrt{\frac{b}{\pi}}\; e^{-bx^2}$$

$$\langle x \rangle = \sqrt{\frac{b}{\pi}} \int x \, e^{-bx^2} \, dx = \, ?$$

$$= 0$$

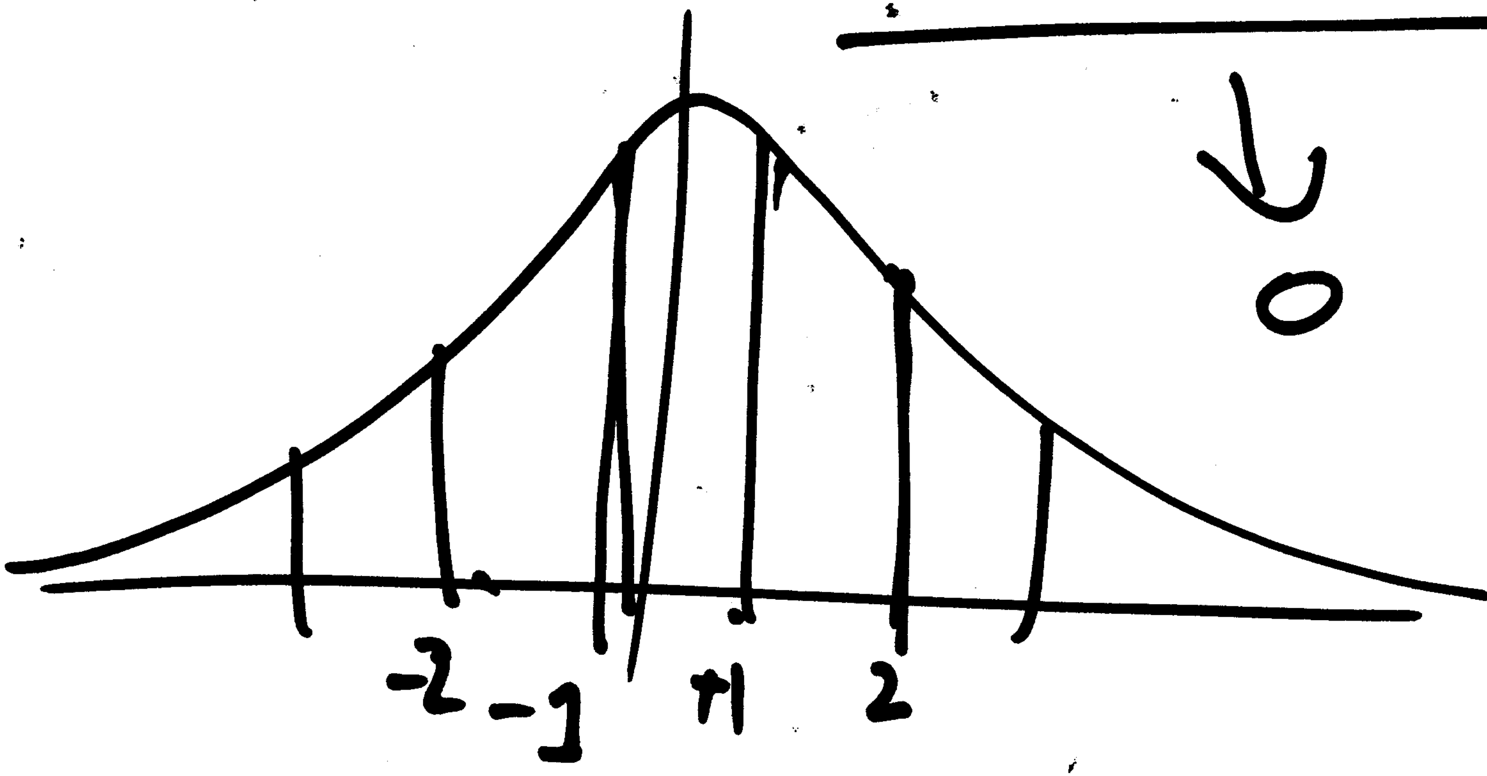


$$\int_{-\infty}^{\infty} x e^{-bx^2} dx = \sum_{i=-\infty}^{\infty} x_i e^{-bx_i^2} \Delta x$$

$$2e^{-b4} + -2e^{-b4}$$

$$\downarrow$$

$$0$$



$$\langle x \rangle = \int x \sqrt{b/\pi}\, e^{-bx^2} = 0$$

$$\cancel{\sqrt{\frac{b}{\pi}} \int x e^{-bx^2} dx = \sqrt{\frac{b}{\pi}} \frac{\partial}{\partial x}}$$

$$\frac{\partial}{\partial x} e^{-bx^2} = e^{-bx^2} \frac{\partial}{\partial x}(-bx^2)$$

$$= e^{-bx^2}(-2bx)$$

$$\int_{-\infty}^{\infty} -\frac{1}{2b}\frac{\partial}{\partial x}\left\{e^{-bx^2}\right\}dx = 0$$

$$-\frac{1}{2b}\frac{\partial}{\partial x}e^{-bx^2} = x\,e^{-bx^2}$$

$$P(x) = \sqrt{\frac{b}{\pi}}\, e^{-bx^2}$$

$$\langle x^2 \rangle = A \int_{-\infty}^{\infty} x^2 e^{-bx^2}\, dx$$

$$\int_{-\infty}^{\infty} \underline{x^2 e^{-bx^2}}\, dx$$

$$x^2 e^{-bx^2} = -\frac{\partial}{\partial b} e^{-bx^2}$$

$$-\int_{-\infty}^{\infty} \frac{\partial}{\partial b} e^{-bx^2}\, dx = -\frac{\partial}{\partial b} \overbrace{\int_{-\infty}^{\infty} e^{-bx^2}\, dx}^{\sqrt{\pi/b}}$$

$$\int_{-\infty}^{\infty} x^2 e^{-bx^2} dx$$

$$= -\frac{\partial}{\partial b}\sqrt{\pi/b}$$

$$= -\sqrt{\pi}\,\frac{\partial}{\partial b}\, b^{-\frac{1}{2}}$$

$$= \sqrt{\pi}\,\frac{1}{2}\, b^{-3/2} = \frac{\sqrt{\pi}}{2\, b^{3/2}}$$

$$\langle x^2 \rangle = \sqrt{\frac{b}{\pi}} \int_{-\infty}^{\infty} e^{-bx^2} \cancel{dx}\, x^2 \, dx$$

$$= \sqrt{\frac{b}{\pi}} \cdot \frac{\sqrt{\pi}}{2 \, b^{3/2}} = \frac{\sqrt{b}}{2 \, b^{3/2}}$$

$$\boxed{\langle x^2 \rangle = \frac{1}{2b}}$$

$$\langle x \rangle = 0$$

$$\langle x^2 \rangle = \frac{1}{2b}$$

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

$$\sigma = \sqrt{\langle x^2 \rangle - \langle x \rangle^2}$$

$$\sigma = \sqrt{\frac{1}{2b} - 0} = \sqrt{\frac{1}{2b}}$$

$$\boxed{b = \left(2\sigma^2\right)^{-1}} \boxed{= \frac{1}{2\sigma^2}}$$

$$P(x) = \sqrt{\frac{b}{\pi}}\, e^{-bx^2}$$

$$b = \frac{1}{2\sigma^2}$$

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

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

$$= A\, e^{-bx^2}$$

$$\sigma = \sqrt{\langle x^2 \rangle - \langle x \rangle^2} = \sqrt{\frac{1}{2b}}$$

$$A e^{-bx^2}$$

$$P(x) = A e^{-b(x-x_0)^2}$$

$$\langle x \rangle = x_0$$

$$\langle x^2 \rangle - \langle x \rangle^2 = \frac{1}{2b}$$

$$P(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-x_0)^2}{2\sigma^2}}$$

$\sigma = 10$

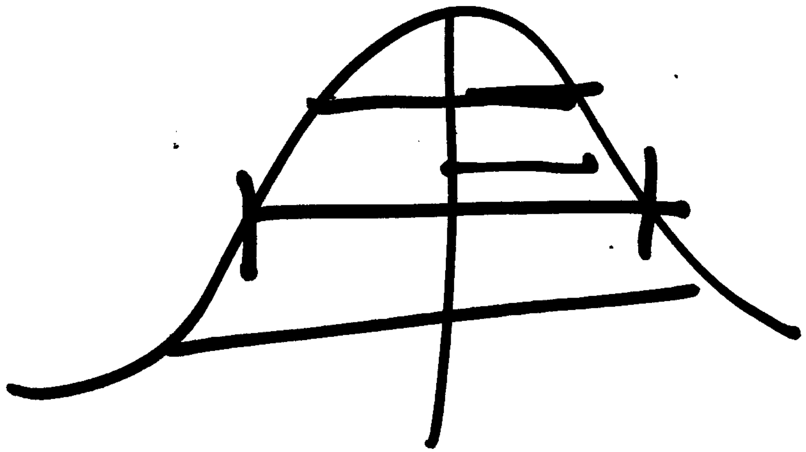
$x_0 = 150$

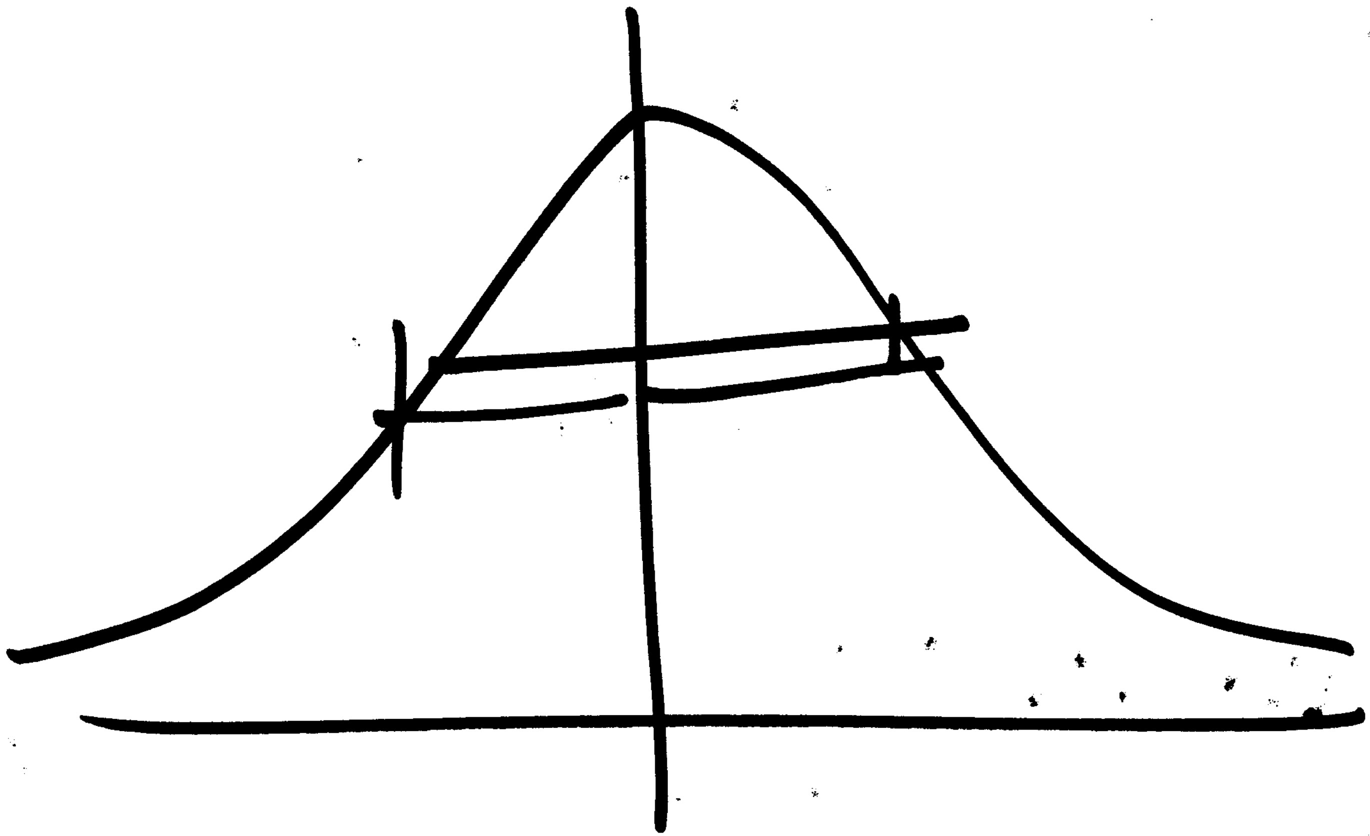
$\langle x \rangle = 150 = x_0$

$$f(x) = A e^{-bx^2}$$

$$p(x) = A e^{-bx^2}$$

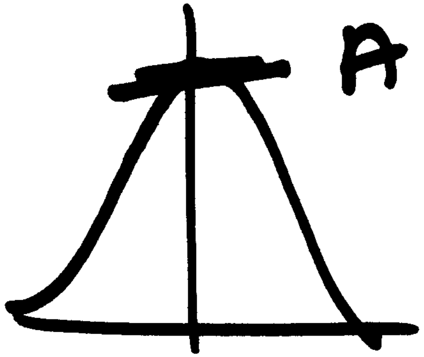
$$= \frac{1}{\sqrt{2\pi\sigma^2}} * e^{-\frac{x^2}{2\sigma^2}}$$





$2x = \sigma$ for a ~~[illegible]~~ "y"

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



$$\sigma = 2x$$

$$= \cancel{\frac{1}{2\pi}} \, A e^{-\frac{x^2}{4x^2 \cdot 2}}$$

$$P(x) = A e^{-\frac{\cancel{x^2}}{8\cancel{x^2}}}$$

$$P(x) = A e^{-\frac{1}{8}}$$

$$e^{-\frac{1}{8}} \approx 88.\%$$

If, $p(x) = A e^{-\frac{1}{8}} = A e^{-0.125}$

$\approx 0.88A$

$$\boxed{\sigma = 2x}$$

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Lec. 23 (17/10/11)

$$\langle x \rangle =$$

$$\langle x^2 \rangle$$

$$\sigma = \sqrt{\frac{1}{2b}}$$

$$A e^{-bx^2}$$

$$\cancel{2\sigma} \quad A e^{-\frac{1}{8}} \Rightarrow \sigma$$