① $f_\mu(x) = \dfrac{e^{-\mu} \cdot \mu^x}{x!}$ $\left(\dfrac{\lambda^x e^{-\lambda}}{x!}\right)$

$g(\mu) = e^{-\mu}$

$g(\mu/x) \propto g(\mu) \cdot f_\mu(x)$

$\propto e^{-\mu} \cdot e^{-\mu} \cdot \mu^x$

$\propto e^{-2\mu} \cdot \mu^{x}$

Compare this with the Gamma distribution

$\boxed{Y \sim Ga(\alpha, \beta)}$ then

$f(y) = \dfrac{\beta^\alpha}{\Gamma(\alpha)} \cdot y^{\alpha-1} \cdot e^{-\beta y}$

$\propto \underbrace{y^{\alpha-1} \cdot e^{-\beta y}}_{\text{Kernel of the Gamma pdf.}}$

Thus, $y = \mu$, $\beta = 2$ and $\alpha - 1 = x$
$\Rightarrow \alpha = x+1$

$\boxed{g(\mu|x) \propto Ga(x+1, 2)}$

2

$$\frac{g(\text{Identical} \mid \text{Same})}{g(\text{Fraternal} \mid \text{Same})} = \frac{g(\text{Identical})}{g(\text{Fraternal})} \cdot \frac{f_{\text{Identical}}(\text{Same})}{f_{\text{Fraternal}}(\text{Same})}$$

$$= \cancel{\frac{1/2}{1/2}} \cdot \frac{1}{1/2} = \underline{2}$$

Identical twins would be <u>twice</u> as likely as fraternals <u>after</u> sonogram results.

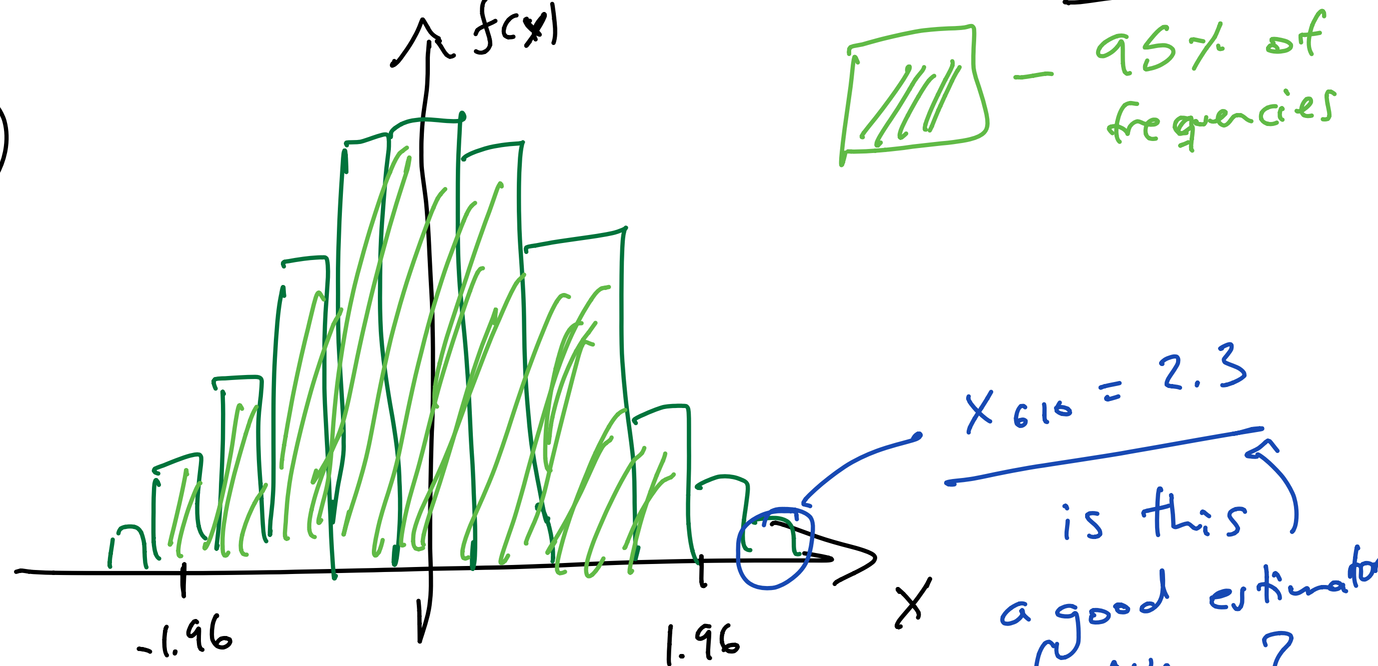
	Same	Diff	
I	1/2	0	1/2
F	1/4	1/4	1/2

$$\frac{1/2}{1/4} = 2.$$

3 We'll do soon..

$x_i \sim N(0, 1)$

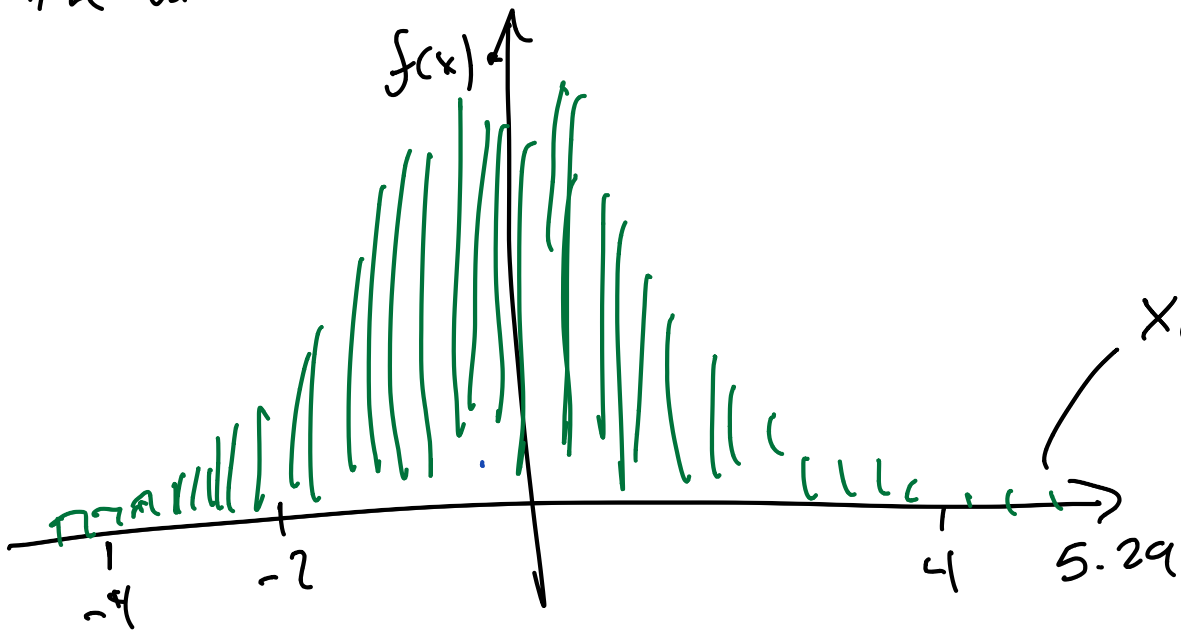
4



$X_{610} = 2.3$

is this a good estimator of μ_{610}?

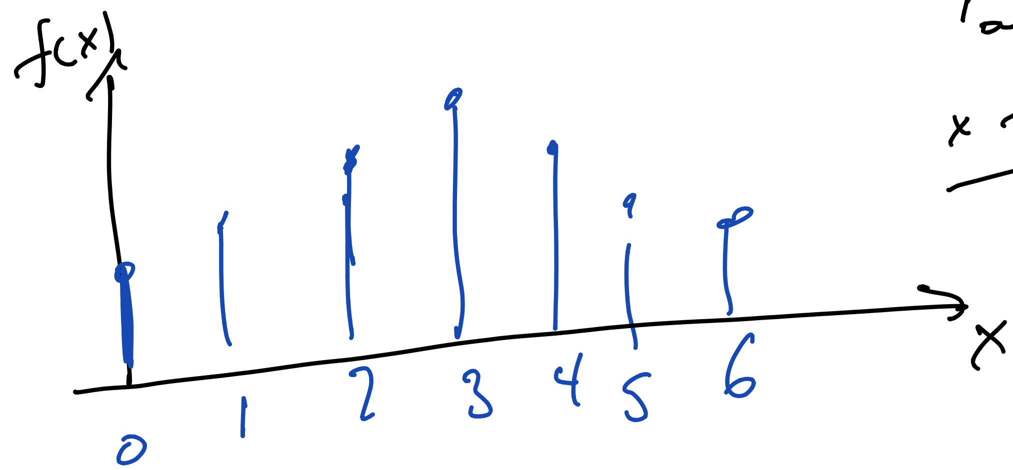
In the book example, we don't know the value of the μ_i's



$X_{610} = 5.29$

Is 5.29 a good estimator for μ_{610}?

(6)



You observed $x \sim Poi(3)$

Say $x = 2$.

Prior $g(\mu)$, Then the posterior

$$g(\mu \mid x) \propto g(\mu) \cdot e^{-\mu} \cdot \mu^{2}$$

But then, some one tells you your detector for x doesn't work for zero!

Would this change your posterior?

Posterior of μ given x <u>doesn't change</u>, as our belief of what parameter μ is only depends on the data (x) through the likelihood.

Now, if we let Y: "Information telling us only $x \geq 1$ can be observed", then, we would have a posterior $g(\mu | x, Y)$.