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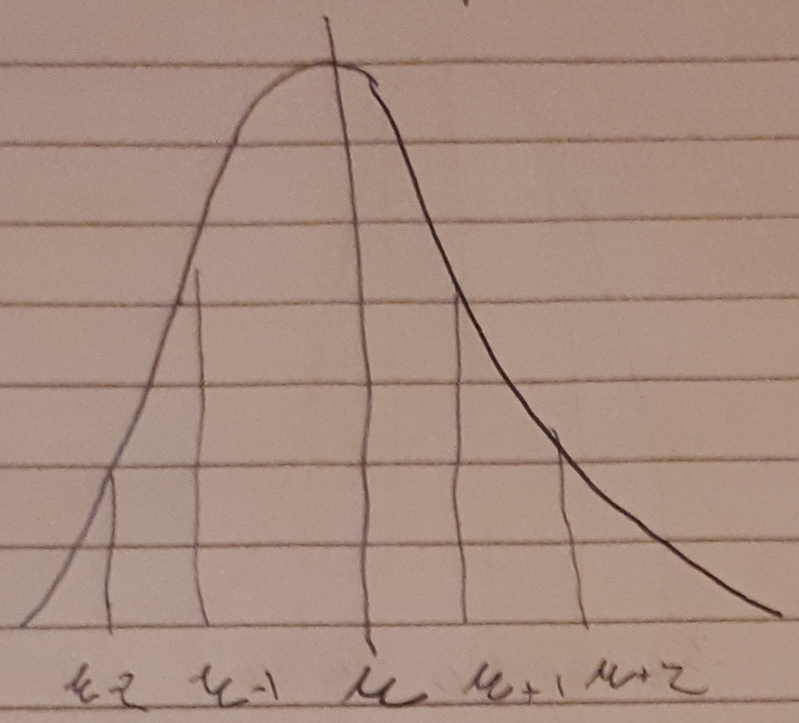
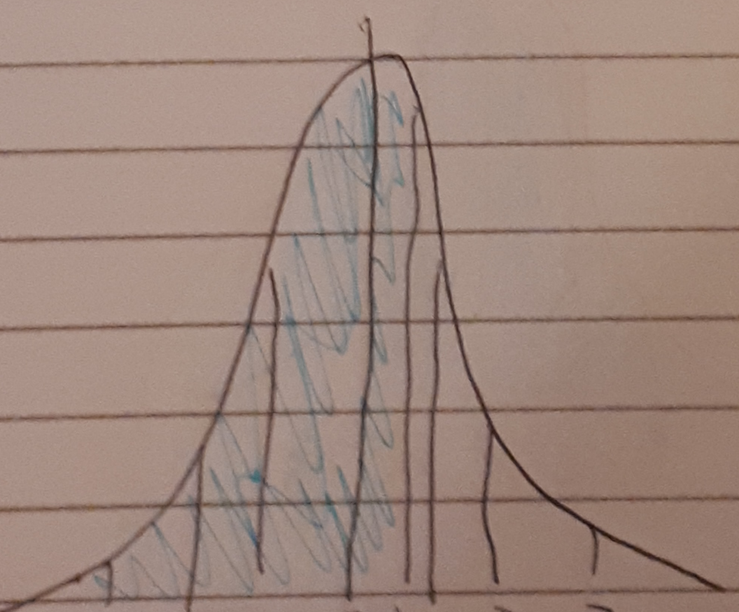
Probability Assignment 2

1) (a) μ $\sigma^2 = 1$

Distribution of Y_i: $Y_i \sim N(\mu, \sigma^2)$



Distribution of $Y_i - \mu$: $Y - \mu \sim N(0, \sigma^2)$



$$\frac{0.5 - 0}{1} = 0.5 = z \text{ score}$$

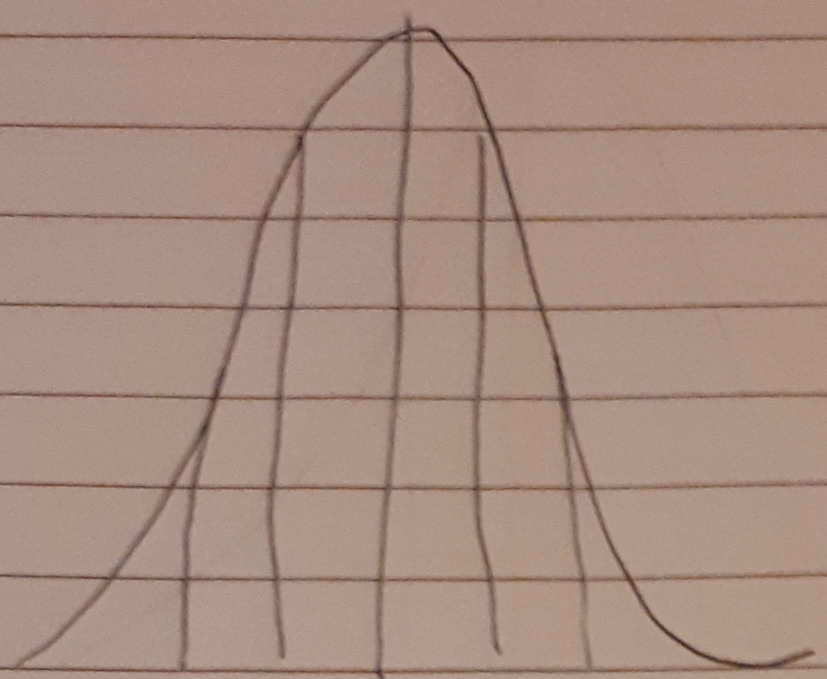
$$p(|Y_i - \mu| \leq \tfrac{1}{2})$$

$$p(z \geq 0.5)$$

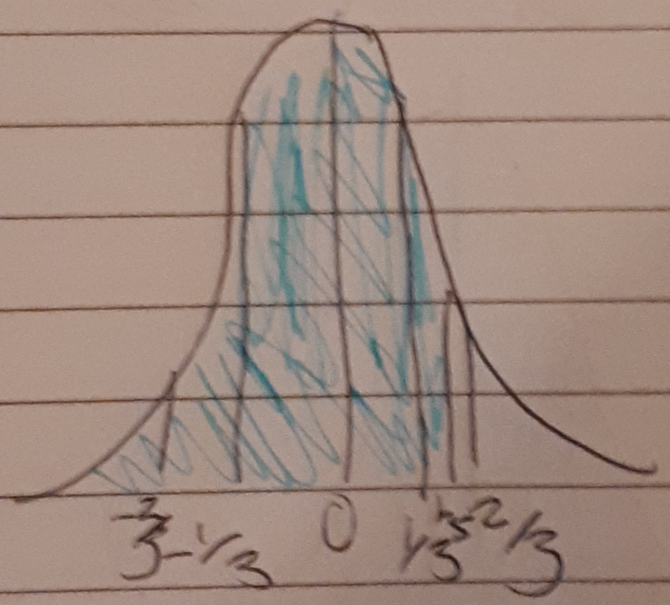
$$= 0.6915$$

(b) $P(|\bar{Y} - \mu| \leq \frac{1}{2})$ $\sigma = \sqrt{\frac{\sigma^2}{n}} = \frac{1}{\sqrt{9}}$

$\bar{Y} \overset{\sim}{\text{approx}} N(\mu, \frac{\sigma^2}{n})$ $\sigma = \frac{1}{3}$



$\bar{Y} - \mu \overset{\sim}{\text{approx}} N(0, \frac{\sigma^2}{n})$



$\frac{0.5 - 0}{\frac{1}{\sqrt{9}}} = 1.5 = z\text{score}$

$p(z \leq 1.5)$

$= 0.9332$

2) $\lambda = 2$

~~per year~~

$X_i \sim Poisson(\lambda)$

$X_i \sim Poisson(2)$

$\lambda = 104$

$X \underset{approx}{\sim} N(104, 104)$

$$\frac{100 - 104}{\sqrt{104}} = -0.392 = zscor$$

$p(z \leq -0.392)$

$= 1 - p(z \leq 0.392)$

$= 1 - 0.6517$

$= 0.3483$