11/10/2023 :
- Normal distribution
- Z-scores

*not necessarily normal* →

$$Z_x = \frac{x - \mu}{\sigma}$$

← spits a #

z-score table

percentile

↑ *if X is normal distribution*

Probability

- you just need $\mu$ and $\sigma$

normal →



33%

67%
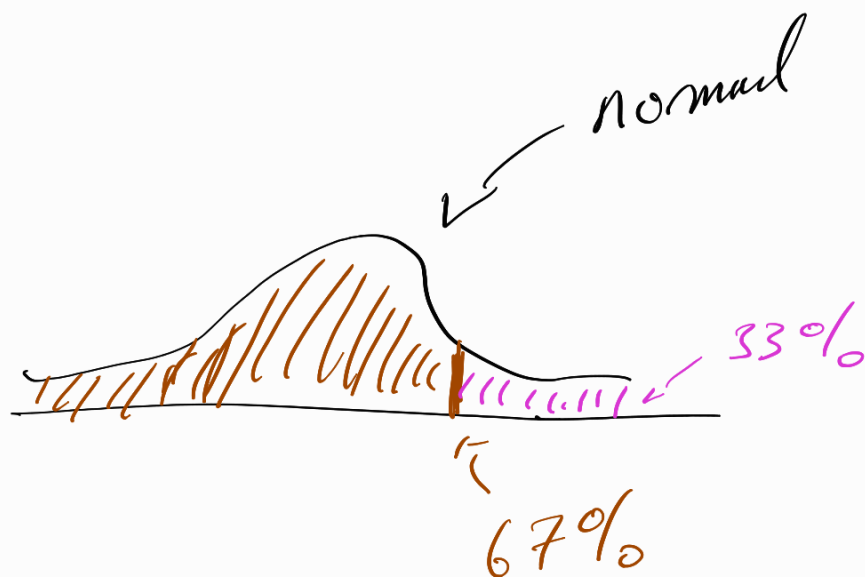
Example. We create lightbulbs

- avg lifespan 1500 hrs

- std dev 75 hrs

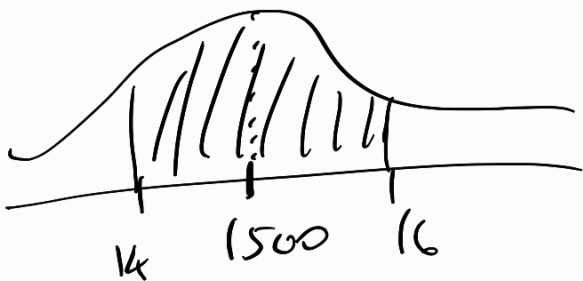- lifespan is normally dist

Q: Prob ↑ lightbulb has lifespan between

randomly selec...  1600 hrs ?
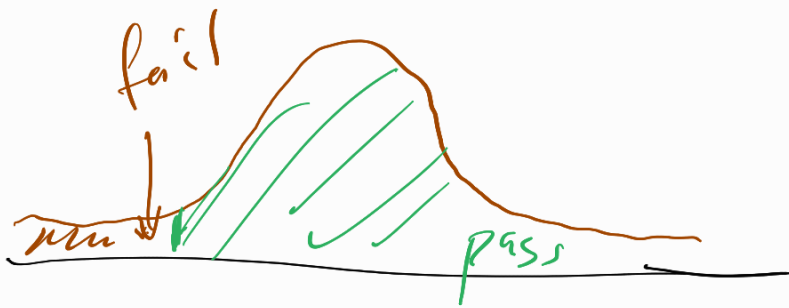
$$\frac{1400 - 1500}{75} = -1.25 \rightarrow 10.56\%$$

$$\frac{1600 - 1500}{75} = 1.25 \rightarrow 89.43\%$$

$$\text{Answer} = \text{prob} = \begin{array}{c} 89.43 \\ -10.56 \end{array}$$

$$\boxed{78.87\%}$$



$1_4 \quad 1500 \quad 1_6$

Example → .20% fails final.

· Final avg score 62

· std dev = 13

How many pts on final are needed to pass?



fail

pass

$$Z = -0.84$$

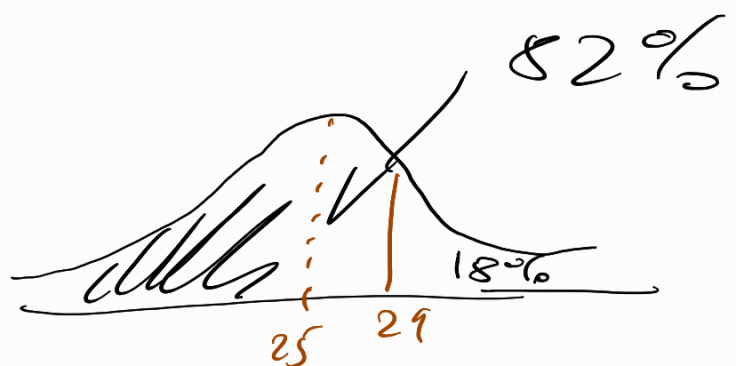$$\hookrightarrow \frac{x - 62}{13} = -0.84$$

$$x = 51.08$$

Must get 51.08 pts

$X$ is normal

• 18% of values are above 29.

• $\mu = 25$

what's $\sigma$?



82%

18%

25   29

$$0.92 = \frac{29 - 25}{\sigma}$$

$$\sigma = 4.347$$

X is binomial (discrete)

$\llcorner_{\rightarrow}$ able to approx w/ cts normal dist.

(gives probability)

if ① $np \geq 10$

② $n(1-p) \geq 10$

$\begin{cases} n = \# \text{ of trials} \\ p = \text{Prob of} \\ \quad\quad \text{success} \end{cases}$