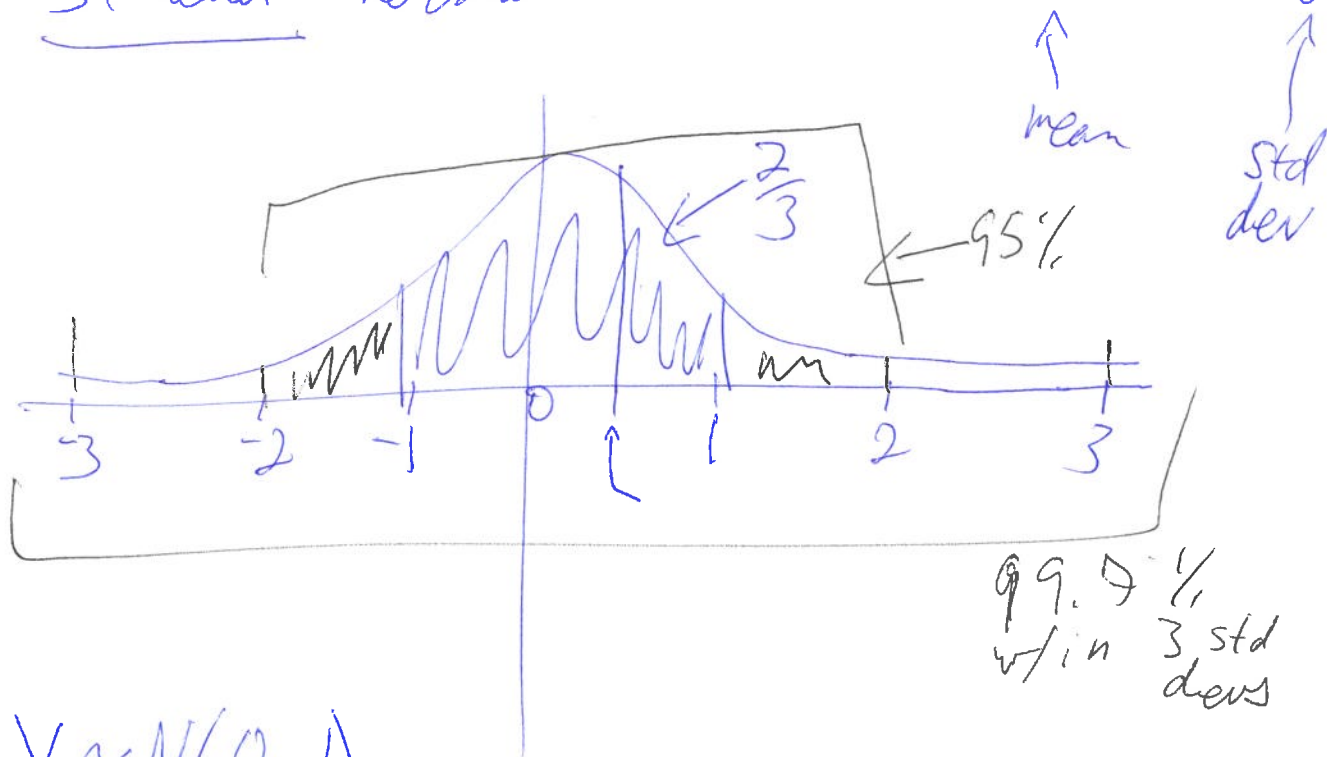


8.5 Normal Distribution

The Standard normal distr. has $\mu=0$ and $\sigma=1$.



Ex $X \sim N(0, 1)$

Normal distr w/ mean $\mu=0$ and
std dev $\sigma=1$.

$$\Pr[X=3] = \text{normal p.d.f.}(3, 0, 1) = 0.0044$$

Score of interest μ σ

Ex $X \sim N(0, 2)$

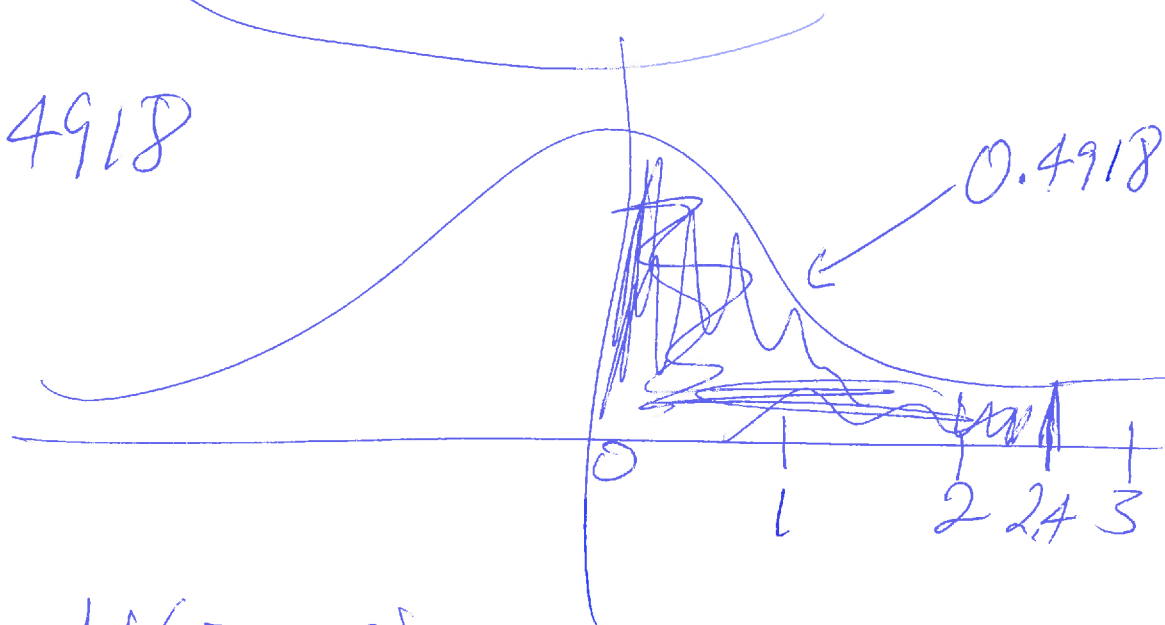
$$\Pr[X=3] = \text{normal p.d.f.}(3, 0, 2) = 0.06476$$

Ex $Z \sim N(0, 1)$

(Z is var to represent
std normal)

$$\Pr[0 \leq Z \leq 2.4] = \text{normalcdf}(\underbrace{0}_{\text{lower}}, \underbrace{2.4}_{\text{upper}}, \underbrace{0}_{\mu}, \underbrace{1}_{\sigma})$$

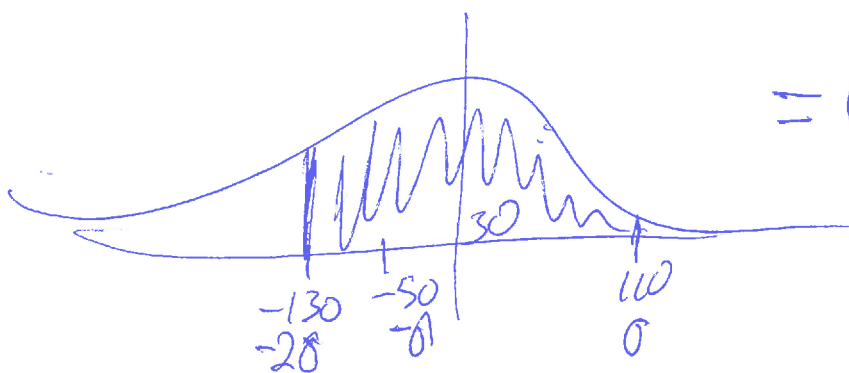
$$= 0.4918$$



Ex $X \sim N(30, 80)$

$$\Pr[-130 \leq X \leq 110] = \text{normalcdf}(-130, 110, 30, 80)$$

$$= 0.81859$$



Ex Quality Control

↳ On avg, $\mu = 50$ lbs/in²

$$\sigma = 0.4$$

Reject if reading is off by more than 1%
(ie, 0.5 away from 50). Above 50.5 or below 49.5

Q What is prob of rejecting sampled product?

Start by determining prob of being in acceptable

range: $\Pr[49.5 \leq X \leq 50.5] = \text{normalcdf}(49.5, 50.5, 50, 0.4)$

$$= 0.7887$$

$$\Pr[X < 49.5 \text{ or } X > 50.5] = 1 - 0.7887$$
$$= 0.2113$$