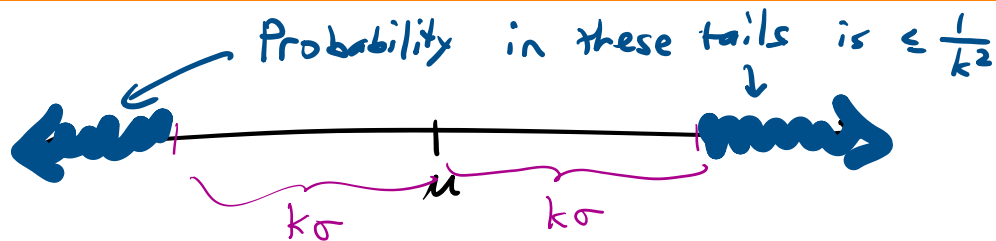Recent homework assignments have asked you to read several articles about the concept of a growth mindset.

- What have you found most insightful or impactful from these articles?
- How could you cultivate a growth mindset, and how could this help you succeed in this course?

Chebyshev's Inequality: Let X be a discrete random variable with mean μ and standard deviation σ. For any $k \geq 1$,
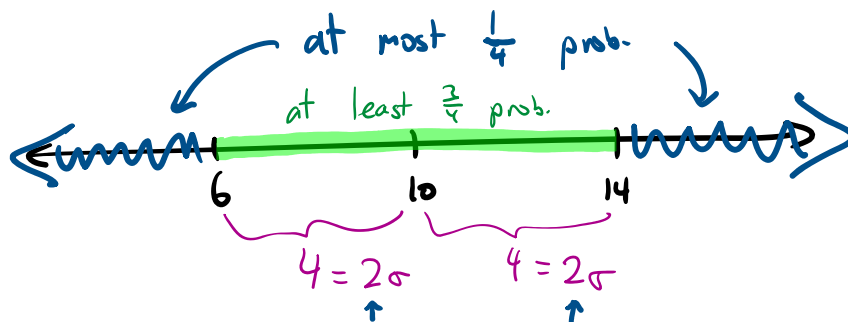
$$P(|X - \mu| \geq k\sigma) \leq \frac{1}{k^2}.$$

In words, the probability that X is at least k standard deviations away from its mean is at most $\frac{1}{k^2}$.

Probability in these tails is $\leq \frac{1}{k^2}$

$k\sigma \quad \mu \quad k\sigma$

EXAMPLE: The waiting time X for a bus has mean 10 and std. dev. 2 minutes.

Find $P(6 < \bar{X} < 14)$.

at most $\frac{1}{4}$ prob.

at least $\frac{3}{4}$ prob.

6   10   14

let $k = 2$.

$4 = 2\sigma \qquad 4 = 2\sigma$

Chebyshev's ineq:

$$P\left(|X - 10| \geq 2(2)\right) \leq \frac{1}{2^2}$$

$$P\left(X \leq 6 \text{ or } X \geq 14\right) \leq \frac{1}{4}$$
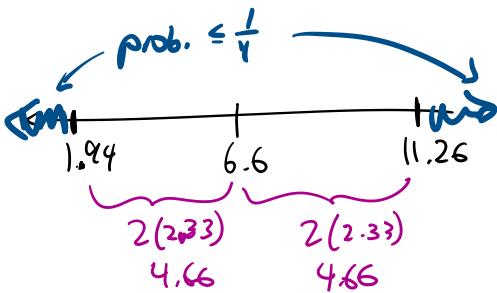
$$\boxed{P\left(6 < X < 14\right) \geq \frac{3}{4}}$$

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② X: $\mu = E(X) = 6.6$

$$\sigma_x = \sqrt{5.44} \approx 2.33$$

$k = 2$

Chebyshev: $P\left(|X - 6.6| \geq 2(2.33)\right) \leq \frac{1}{2^2}$

$\downarrow$

$$P\left(X \leq 1.94 \text{ or } X \geq 11.26\right) \leq \frac{1}{4}$$

$$0 \qquad \leq \frac{1}{4}$$

Since X only takes values 4, 5, 8, 10

prob. $\leq \frac{1}{4}$

1.94   6.6   11.26

2(2.33)   2(2.33)
4.66   4.66