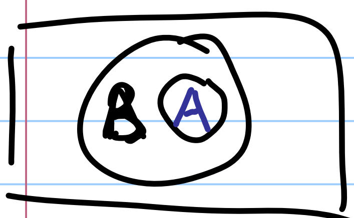
Lecture #4

- $X \sim N(300, 50^2)$ $\mu=300$, $\sigma=50$. Q1 is $P(X \leq 365)$
  define $Z = (X-300)/50$, then Z is standard normal

$P(X<365)$ → $X = 50Z+300$

$= P(50Z+300<365) = P\left(Z < \frac{65}{50}\right) = P(Z<1.3) = 0.903$



$P(AB) = P(A)$ when $A \subset B$

$E[X] = \sum_k k\,p(k)$ $E[g(X)] = \sum_k g(k) \cdot p(k)$

- $F_{XY}(x,y)=P(X\leq x, Y\leq y)$
- $F_{XY}(x,y)=F_X(x)F_Y(y)$ independent

$P_{X|Y}(x|y) \Rightarrow P(X\leq x \mid Y \leq y)$

$P(X\leq x, Y\leq y) \stackrel{?}{=} P(X\leq x)\cdot P(Y\leq y)$

- r.v. X: μ=1000, σ=200,

$$p(\mu - \underset{?}{x} \le L \le \mu + x) = 0.75$$

r.v. L : length of a doc

$$L \sim N(1000, 200^2)$$

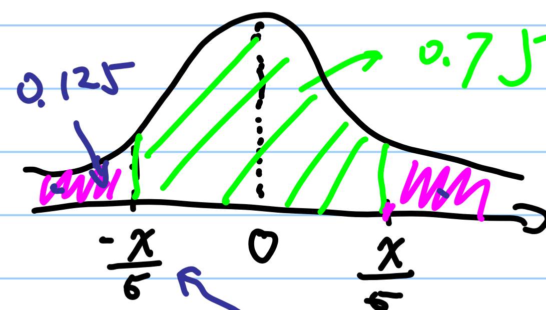
define r.v. $Z = \frac{L - \mu}{\sigma} \sim N(0, 1)$

$$p(\mu - x \le \sigma z + \mu \le \mu + x)$$

$$= p\left(-\frac{x}{\sigma} \le z \le \frac{x}{\sigma}\right) = 0.75$$

$$= p(-1.2 \le z \le 1.2) = 0.75$$

$$\frac{x}{\sigma} = 1.2 \rightarrow x = 1.2 \times 200 = 240$$



$$p(z \le \underset{1.2}{\alpha}) = 0.875$$