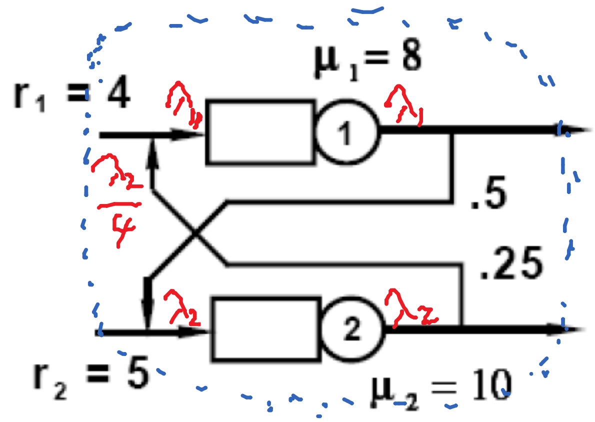
Wednesday, November 25, 2015 11:57 AM



little's Law: $N = \lambda T$

$$\lambda = r_1 + r_2 = 9$$

$$N = E[N] = 7$$

$$\Rightarrow E[T] = \frac{E[N]}{\lambda} = \frac{7}{9}$$

$$\begin{cases} E[T^{(1)}] = \dfrac{1}{\mu_1 - \lambda_1} + \underbrace{\left[0 \times 0.5 + 0.5 \times E[T^{(2)}]\right]}_{\text{law of total prob.}} \\ E[T^{(2)}] = \dfrac{1}{\mu_2 - \lambda_2} + \left[0 \times 0.75 + 0.25 \times E[T^{(1)}]\right] \end{cases}$$

$$\lambda_1 = 4 + \lambda_2/4$$

$$\lambda_2 = 5 + \lambda_1/2$$

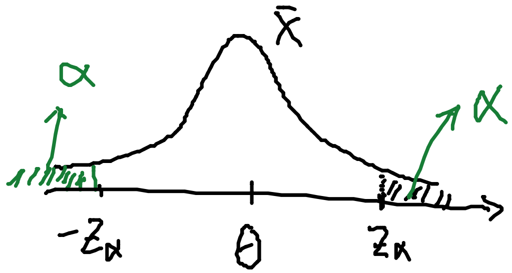
Wednesday, November 25, 2015 12:56 PM

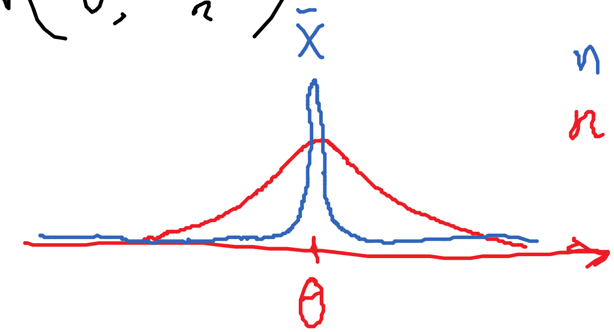
$$E[\bar{X}] = \theta \qquad Var(\bar{X}) = \frac{\sigma^2}{n}$$

$$\bar{X} \sim N\left(\theta, \frac{\sigma^2}{n}\right)$$

r.v. X

$$Z \equiv \sqrt{n}\frac{(\bar{X} - \theta)}{S}$$





$\alpha = 0.025$

$P(Z \leq 1.96) = 0.975$

$Z_{0.025} = 1.96$

$$P(-Z_\alpha \leq \bar{X} \leq Z_\alpha) = 1 - 2\alpha$$

election poll = 40% ± 2% ⟶ 95% confidence [38% - 42%]

90% confidence interval: ?   95% $(\bar{X} \pm 1.96 S/\sqrt{n})$

Wednesday, November 25, 2015   1:10 PM

$\alpha = 0.05$

$P(Z \le Z_\alpha) = 0.95$

? → lookup, we have 1.65

90% confidence interval: $\left[\bar{X} - \frac{1.65 S}{\sqrt{n}},\ \bar{X} + \frac{1.65 S}{\sqrt{n}}\right]$

48% ± 10%   (38% ~ 58%)