Formulas

① $C.I = \bar{x} \pm z\sqrt{\frac{\sigma^2}{n}}$ (2 tail)

② $z = \phi^{-1}\left(1 - \frac{\alpha}{2}\right)$ if 2 tail

③ $z = \phi^{-1}(1 - \alpha)$ if 1 tail

α = significance level

$\boxed{\alpha = 1 - \frac{C.I}{100}}$

④ If hypothesis with given significance level
- → find z, z values
- → compare both values
- → if test value is less than original value accept H_0
- → if test value is more than original value reject H_0

⑤ Binomial $\xrightarrow{np>5 \quad nq>5}$ Normal (CC)

Binomial $\xrightarrow{np<5 \quad n>50}$ Poisson

Poisson $\xrightarrow{\lambda > 15}$ Normal (CC)

⑥ Critical Region → Rejection region
- → when probability is just less than significance that is the critical region.
- → $\boxed{P(x \le C) < \alpha}$

⑦ Type I error } if in rejection region
- → Reject H_0, but H_0 is true

⑧ Type II error }
- → Accept H_0, but H_0 is false

(9) $E(x) = \int x \cdot f(x)\, dx$

(10) $Var(x) = \int x^2 \cdot f(x)\, dx - [E(x)]^2$

(11) if A is the start value then

$\int_A^M f(x) = 0.5$ | M is the median

(12) if $S \sim N(14, 3)$
$L \sim N(53, 11)$

Find $L - 4S \sim N(?;?)$

$E(4S) = 4(14) = 56$
$E(L) = 53$
$E(L - 4S) = 53 - 56$
$\boxed{E(L - 4S) = -3}$

Variance of a constant is 0
$Var(11M + 0.5)$
$= Var(11M) + Var(0.5)$
$\underline{Var(11M) + 0}$

$Var(4S) = 4^2(3)$
$= 48$
$Var(L) = 11$
$Var(L - 4S) = 11 + 48$
$= 59$

Mean of a constant is constant.
$\underline{E(0.5) = 0.5}$

Note: you always add in variance.

=> Poisson
- → Constant mean
- → Occuring independently
- → random occurance.

(13) $Est(\mu) = \frac{\Sigma x}{n}$

(14) $Est(\sigma^2) = \frac{1}{n-1}\left[\Sigma x^2 - \frac{(\Sigma x)^2}{n}\right]$

(15) Central limit therom
→ if used, reason → population distribution is unknown.

(16) width = $2z\sqrt{\frac{pq}{n}}$

(17) Substitute the lower limit or upper limit in $f(x)$ to obtain $f(x) = 0$.

(18) ϕ^{-1}[of any number below 0.5]

$$\rightarrow \phi^{-1}[0.0668]$$
$$= -\phi^{-1}[1 - 0.0668]$$
$$= -\phi^{-1}[0.9332]$$
$$= -1.5$$

★ negative sign is very important.

(19) $\bar{x} = \frac{\Sigma fx}{n}$

$$Var(x) = \frac{1}{n-1}\left[\Sigma fx^2 - \frac{[\Sigma fx]^2}{n}\right]$$

(20) If $P(X = x)$ is given:

$$\bar{x} = \Sigma x P(X = x)$$

$$Var(x) = \Sigma x^2 P(X = x)$$

(21) $1 - C.I = P(\text{Rejection})$

(22) If Type II error in Binomial is asked use the new probability given to find the probability use same 'n'

classmate
Date
Page

(23) if probability density function given
- → area = 1
- → no negative 'y' values
- → median = 0.5
- → if any percentile asked
  - → 60^{th} percentile $\int_{LL}^{m} f(x)\, dx = 0.6$

(24) If in Normal hypothesis
Z is positive, inequality is >
and vice versa

(25) finding Type II error in Normal hypothesis

- → find new $\bar{x}$ using original μ, equate with z
- → Use new $\bar{x}$ with new μ to find probability
- → then $1 - \phi[\ ]$

(26) C.I for proportion

$$p \pm z\sqrt{\frac{pq}{n}}$$

(27) if random sample is written divide by '$\sqrt{n}$'
if randomly chosen is written 'dont' divide by '$\sqrt{n}$'

(28) Explain Type I and Type II error in context
→ "Conclude that the mean of ______ has reduced when it actually has not." } Type I

→ "Conclude that mean of ______ has not changed when it actually has } Type II