① $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

② $P(B/A) = \dfrac{P(A \cap B)}{P(A)}$.

③ $P(\overline{B}) = 1 - P(B)$.

④ $P(A \cap \overline{B}) = P(A) - P(A \cap B)$

⑤ $\int 1 = x$, $\int x^2 = \frac{x^3}{3}$.

⑥ $\int_{-\infty}^{\infty} = \int_{0}^{\infty}$

⑦ Mean of CRV = $\mu = \int_{-\infty}^{\infty} x \cdot f(x)\, dx$

⑧ $e^{-|x|} \to$ is an even fun $\to$ take ②

⑨ $\underbrace{\underset{\text{odd}}{x} \cdot \underset{\text{even}}{e^{-|x|}}}_{\text{even}}$

⑩ $\int_{-a}^{a} f(x)\, dx$.

$= 0$ if $f(x)$ is odd.

$= 2$ if $\int^{a} f(x)\, dx$.

if $f(x)$ is even.

⑪ Varience of CRV = $\sigma^2 = \int_{-\infty}^{\infty} x^2 f(x)\, dx - 0$

12) $\frac{1}{2} \int_{-\infty}^{\infty} \underbrace{\underset{\text{even}}{x^2}\, \underset{\text{even}}{e^{-|x|}}}_{\text{even}}\, dx = \frac{1}{2}$

(13) $\int_0^\infty x^2 e^{-x} dx$

$$\left[(x^2)\cdot\left(\frac{e^{-x}}{-1}\right) - (2x)\cdot\left(\frac{e^{-x}}{1}\right) + 2\left(\frac{e^{-x}}{-1}\right)\right]_0^\infty$$

(14) $\sum_0^4 \frac{e^{-2}\cdot 2^x}{x!} = e^{-2}\left[\frac{2^0}{0!}+\frac{2^1}{1!}+\frac{2^2}{2!}+\frac{2^3}{3!}+\frac{2^4}{4!}\right].$

(15) $3! = 3\times 2\times 1.$

(16) $e = 2.718$

(17) $e^{-2} = \frac{1}{e^2}.$

(18). ~~Chebyshev's theorem~~ - given M, SD.

Mean = $E[X] - E[Y]$.

Var = $V[X]^2 + V[Y]^2$

SD = $\sqrt{Var}$

} Independent.

(19) If r is the co-relation coeff then

$cov(X,Y) = r\,\sigma_x\,\sigma_y.$

(20) - given M, SD.

Mean = $E[X] - E[Y]$.

Var = $V[X]^2 + V[Y]^2 - 2.Cov.(X,Y)$

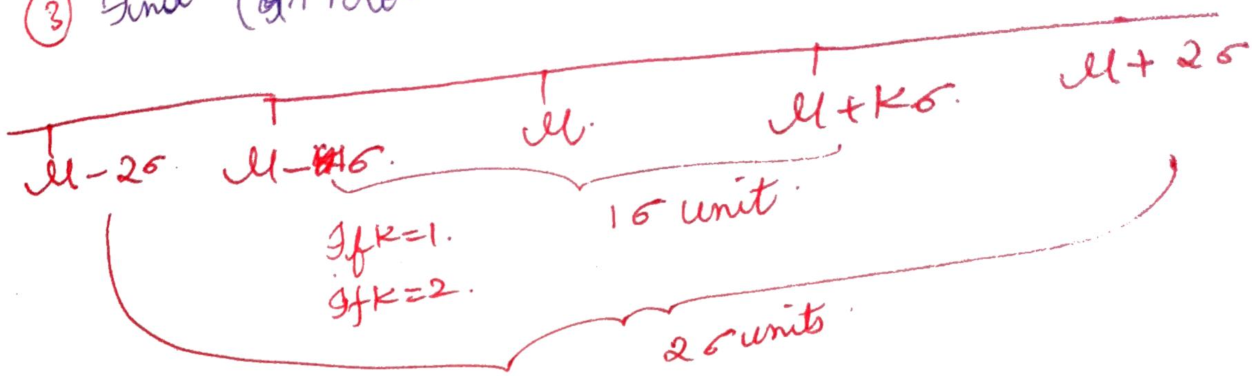
SD = $\sqrt{Var}$.

~~Hence~~ To find out if the Ques is Chebyshev's Thm

① unknown prob dist - (no idea)

② μ & σ^2 or μ & σ are given

③ Find (~~Q~~ Prob interval given)



㉒ $\boxed{k = \frac{x - \mu}{\sigma}}$ C.T.

Right of Mean $\boxed{x = \mu + k\sigma}$ (left of mean $= [x = \mu - k\sigma]$).

㉓ $P[-4 < X < 20]$.

$P(X = -4)$, $k = \frac{X - \mu}{\sigma}$

$P(X = 20)$, $k = \frac{x - \mu}{\sigma}$

$P[\mu - k\sigma < X < \mu + k\sigma]$. $1 - P[-6 |x-8| 6$

$\boxed{1 - \frac{1}{k^2}}$ $1 - P\{|X - 8| \le 8\}$. $\frac{1}{k^2}$.

㉔ $P[|x-8| \ge 6]. = 1 - P[-6 < |x - 8| < 6]$

$\boxed{\frac{1}{k^2}}$

㉕ mention unit after prob

11) Chebyshev's Inequality

$$P(|\underset{\downarrow}{X} - \underset{\downarrow}{\mu}| \geq \underset{\downarrow}{K}\underset{\downarrow}{\sigma}) \leq \frac{1}{K^2}.$$

RV EV. no of SD from mean. SD.

std prob.

27) Unknown Prob.

many or too many few screws.

Unbiased die.

X	2	3	4	...	12
$P(X)$	1/36				1/36

E(X) ✓

Var(X) ✓

$$P[|X-\mu| \geq C] \leq \frac{\sigma^2}{C^2}$$

actual val — $|x-7| \geq 3$

$\frac{1}{3}$

$= X \leq 7-3$ (OR)

$x \geq 7+3$.

2,3,4.   10,11,12

Transition prob = sum of each row should be = 1

(29) To check regular stochastic Matrix:

(a) all +ve, no zeroes
(b) no '1' in diagnol
(c) sum of each row = 1.

do A^2, A^3, A^4.

(30) Markov chain irreducable = ?

1. keep row no's & col no's
2. draw STD (~~create new matrix, and compare desite like this~~)
3. class of state = { } (Check if they are communicating with all)

(31) [ ] is ergodic? [all elemets of recurrent] [& aperiodic]

1. keep row no's & col no's
2. draw STD.
3. $d(i) = 1$. [aperiodic].

so find GCD $\xrightarrow{\text{ways}}$ ways.

eg $d(0) = \{2, 3\} = 1$.

4. 2 states comm with each other & other 2 states dont com with each other (in STD) ∴ prob is less than 1.

Note equally likely = 1/2

(38) Steady State Vector

(1) pt ÷ all are +ve. [ ]

(2) P = [ ].

(3) V = prob vector ∴ $[v_1 \; v_2 \; v_3] \ni VP = V$ $= 1$

(4) $[v_1 \; v_2 \; v_3] \begin{bmatrix} & & \end{bmatrix} = [v_1 + v_2 + v_3] = 1$ $\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$.

(5) col (+ +) (+ +) (+ +)

$(av_1 + dv_2 + gv_3)$
$(bv_1 + ev_2 + hv_3)$
$(cv_1 + fv_2 + iv_3)$

(6) eq vars entri

$av_1 + dv_2 + cv_3 = v_1$. — (1)

$bv_1 + ev_2 + hv_3 = v_2$ — (2)

$cv_1 + fv_2 + iv_3 = v_3$ — (3)

(7) 3 is sum of (1) & (2), mul by −1 so dont consider (3)

(8) w.k.t V is Prob vect so.

$\boxed{v_1 + v_2 + v_3 = 1}$ — (4)

(9) write in Matri format of eq's (1) (2) (4).

$\begin{bmatrix} & & \end{bmatrix} \begin{bmatrix} v_1 \\ v_2 \\ v_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$.

(10) use Gauss jordan. $[R_2 \leftrightarrow R_1]$ like that. like k i $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$v_1 =$.
$v_2 =$
$v_3 =$.

(11) SSV is $[v_1 \; v_2 \; v_3] = [\;,\;,\;]$.

value = Total. $\sum \frac{(O_f - E_f)^2}{E_f}$

(8) Table val of x^2 =

degree of freedom $\nu = (m-1)(n-1)$

$= (3-1)(3-1) = 2 \times 2 = 4$

$\nu = 4 \to$ DOF.

$\chi^2_{0.05}(4) = 9.48$

0.05 → LOS

(49) mostly $\chi^2 >$ Table value

∴ Reject H_0.

Accept H_1

(50) n is small so go for t test. ($n \leq 30$)

eg 28 30 32 33 33 29 34 ← n = 7.

(51) $t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$, $s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1}$

— ③ Q.

39) **B.D**

$$\boxed{n C_x (p)^x (q)^{n-x}}$$

first n, p, q.

40). Eg $8C_3 \Rightarrow \frac{8!}{5!\,3!}$

41). $(x \leq 4) = \sum_{0}^{4} (8Cx)\left(\frac{1}{2}\right)^x \left(\frac{1}{2}\right)^{8-x}$.

— ④ Q.

42) Poison. $\boxed{\frac{e^{-\lambda} \cdot \lambda^x}{x!}}$

— ④ Q

43). SD ✓, M ✓, n ✓.

b/w = x = ? → $x_1 < Z < x_2$

$$\boxed{Z = \frac{x - \mu}{\sigma}}$$

Check N.D.T.

− +

+.

x(n).

43). X value more so.

eg $P(X \geq 2) = 1 - P(X=0) + P(X=1)$.

x = ? SD

44) no 'n' value so go with poison

'n' value use Binomial.

45)

Null Ho. =

Alt Ho. =

Sig = 5%

χ^2

Obs freq	Exp freq	(O-E)^2	(O-E)^2/E
10	21.4		
20	:		
30	:		

Tot.

(46) Expected freq

$$\frac{\text{col Tot} \times \text{Row Tot}}{\text{grand Tot}}$$

for each value find out

eg 40   55   69   for a val.

② Q 4th cit

$n \geq 30$ large sample, Z test

(52) sample mean $= \bar{x}$ (in large sample).

(53) Significance mod in Q = 4th chapt hyp, take 0.05 as LOS $\rightarrow$ 1.96.

(53) when $n_1, n_2, \bar{x}_1, \bar{x}_2, S_1, S_2$ r given

take sig = 0.05.

$\therefore$ ① $H_0 = \mu_1 \neq \mu_2$

② $H_1 = \mu_1 \neq \mu_2$.

③ LOS = 0.05

④. Table val of z = 1.96. large sample - z test.

⑤ Test stats is

$$\boxed{Z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}}$$

⑥. cal Z = ~~val > 1.96~~.

Z val $\geq$ Table val.

⑦ Reject H_0.

⑧ $\therefore$ There is significant diff b/w the means.

(54) Out of ~~is given~~ in Question it is Proportion.

Eg 30 out of 50.

$p = \frac{30}{50} = 0.6$.

p. P.

(55) Small letters — Sample.

cap letters — Population.

39) (56) % given 150 . $P = \cancel{80}\ \cancel{70}\ \%$.
eg. survival rate = 70%

$\therefore P = \frac{70}{100}$, $P = 0.7$.

$Q = 1 - P = 0.3$.

40

$H_0 = 0.7$.
$H_1 = P > 0.7$, One tail
$LOS = 0.05$.
$Z_t = 1.645$.

4

Test S = $\boxed{Z = \frac{p - P}{\sqrt{\frac{PQ}{n}}}}$

4

8Q - Unit 5

(57) probability after 2 transition $= P_0 P^2$.

(58) Limiting probability = $\boxed{XP = X}$.

$(x\ y\ z) \begin{bmatrix} & \\ & \end{bmatrix} = (x\ y\ z)$.

$\frac{P(\frac{A}{B}) \cdot P(B)}{P(\frac{A}{B}) \cdot P(B)}$

59) Bayes Theorem

$$P(B_k/A) = \frac{P(B_k \cap A)}{\sum_{n=1}^{n} P(B_i \cap A)} = \frac{P(A/B_k) P(B_k)}{\sum_{i=1}^{n} P(A/B_i) P(B_i)}$$

60) defective - Bayes Theorem
Given . $P(A), P(B), P(C)$
$P(D/A)$ $P(D/B)$ $P(D/C)$ } given.

(61) Req Prob. $\frac{(\qquad)}{}$ E part Mothan.

x	1	2	3	4	5	6.
$P(x)$	all k's.					

find $k = ?$

$\hookrightarrow \sum P(x) = 1.$

add all k's = 1.

eg $k + 3k + 4k + 7k = 1.$

66 Eucleytini Manaki $P(x)$ Toh Sanbandam.
only sulu k.

67 $$\boxed{\int_{-\infty}^{\infty} y \, dx = 1.}$$

y is given in Q
ie range

68 $\int 1 = x$

$\int x^2 = \frac{x^3}{3}.$

while integrating, k to left.
dont forget $\int$ on 1
UB − LB.

b) part =1 radu.
Sulu k value if
found out.

69) $P(x>0) = P(x=0).$
as $P \; 1-(x<0)$ −ve ignore
take 0

70) $0! =$ no value, take only numerator value

71) more values take e^{-x} as common

12). Given Mean & SD & $n \leq 30$ & $\angle$ LOS

$\boxed{\text{no variance}}$

Eg steal beam prob.

1. Go for T-test.
2.
   a) write n value
   b) write $\bar{x}$ value.
   c) write SD value.
   d) Write DOF $= \boxed{n-1} = V$. Eg $6-1=5$

V 0.025

5

3.
   a) ~~Null~~ H_0 (=).
   b) H_1 ($\neq$). (Two Tail).
   c) LOS = 0.05.
   d) TOS = $\boxed{t = \dfrac{\bar{x} - \mu}{S\sqrt{n-1}}}$
   e) sub & get $\boxed{T_{cal}}$ value.
   f) Checking Table
      a) 2 tail write $\dfrac{LOS}{2} = \alpha$ value.
   g) Since $t = t_{cal} < t_{tab} = t_{\alpha/2}$.

      We accept Null hyp.

13). Given $n \leq 30$, x values, $\boxed{\text{no S.D}}$, no LOS.

e) $\boxed{S^2 = \dfrac{\Sigma(x-\bar{x})^2}{n-1}}$

1. Go for T-test Single Mean.
2.
   1) Add x values.
   b) ~~Add~~ $\boxed{\bar{x} = \dfrac{\Sigma x}{n} =}$
   c) ~~Add~~ Calculate $(x-\bar{x})$ Values.
   d) Add $(x-\bar{x})$ value

x	$x-\bar{x}$	$(x-\bar{x})^2$
		Tot
Tot		

SD $= \sqrt{}$

$n =$

$\bar{x} =$

13

(3)

(a) Null hyp $H_0 =$

(b) A $H_1 \neq$ (Two Tail)

(c) LOS = $\alpha = 5\%$

(d) $\boxed{|t| = \dfrac{\bar{x} - \mu}{\frac{S}{\sqrt{n}}}}$

Eg IQ prob

(e) Sub to get tcal value

f) DOF $= \nu = n-1$

g) Two tail $= \frac{\alpha}{2} =$

h) = Tval = ______

i) tcal < Ttable

accept H_0.

(4) Range = Confidence Interval

$\boxed{\bar{x} \pm t_{\alpha}\left(\frac{S}{\sqrt{n}}\right)}$

Given : 2 samples with Mean & (SD).

(74) Go for t-test for diff of means.

Eg husband wifes.

(1) $n_1 =$

(2) $n_2 =$

(3) $\bar{x} =$ add all / n

(4) $\bar{y} =$ add all / n

(3) SD =

$$S^2 = \frac{1}{n_1 + n_2 - 2}\left[\sum (x_1 - \bar{x})^2 + \sum (y_i - \bar{y})^2\right]$$

(5)

x	$x-\bar{x}$	$(x-\bar{x})^2$	y	$y-\bar{y}$	$(y-\bar{y})^2$

$S^2 =$ ______

$S =$ ______

(4). (OR) $\boxed{S^2 = \frac{n_1 S_1^2 + n_2 S_2^2}{n_1 + n_2 - 2}}$

(3).

(a) $H_0 = \mu_1 = \mu_2$.

(b) Check Q = if More $\Rightarrow \mu_1 > \mu_2$.
(one tail).

(c) $\alpha = 0.05$, $\boxed{DOF = n_1 + n_2 - 2}$

(d) $\boxed{t = \frac{\bar{x} - \bar{y}}{S\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}} \longrightarrow \boxed{|\bar{x} - \bar{y}| = |t| \cdot S\sqrt{\frac{1}{n} + \frac{1}{n}}}$

Question given to find

(e) Sub ee get t_{cal}.

(f) $t_{cal} < t_{tab}$.

(g) accept H_0.

(15) Ques given – 2samples, diff of significance.

(1) go for F-test

(2) $n_1 =$, $n_2 =$, $\Sigma(x-\bar{x})^2$, $\Sigma(y-\bar{y})^2$ — (eg sum of squares)

(3). $S_1^2 = \frac{\Sigma(x-\bar{x})^2}{n_1 - 1}$

$S_2^2 = \frac{\Sigma(y-\bar{y})^2}{n_2 - 1}$

a). Null : $\sigma_1^2 = \sigma_2^2$.
b) Alt = $\sigma_1^2 \neq \sigma_2^2$ (2 tail).
c) Sig = 0.05.
d). Test Stats = $\boxed{F = \frac{S_1^2}{S_2^2}}$.
e) Sub to get F_{cal}.   x, y.
g). DOF = Fval of Table.
h). $F_{cal} < F_{Table\ val}$.
i) accept H_0.

76). Large Sample Z-test ($n \geq 30$).
1). Z test for Single Mean [mean, SD with 1 Sample] 5
2). Z test for diff of Mean [mean, SD with 2 samples]
3) Z test for single prop [No mean, No SD, 1 sample] 2
4) Z test for diff of prop [no mean, NO SD, 2 saples]

77). 5% one tail value = ~~1.96~~.
5% two tail value = ~~1.645~~.

18). Given : $n \geq 30$, mean, 1 sample.

1. Go for Z test with Single Mean.

Eg
aught
ocean
ambulate
tyres

2. $n =$, $\bar{x} =$ (mean of sample)
$\mu =$ (overall mean)., $\sigma =$ SD

3. a. Null $H_0 = \mu_1 = \mu_2$.
b. Alt $H_1 = \mu_1 > \mu_2$. (1 tail). [$\alpha < \frac{\alpha}{2}$]
Alt $\mu_1 \neq \mu_2$ (2 tail

c. LOS $= 0.05\%$.
$=$ 1 tail $\rightarrow$

d. Test Stats $-$ $\boxed{Z = \dfrac{\bar{x} - \mu}{\dfrac{\sigma}{\sqrt{n}}}}$

e. $|Z|_{cal} < Z_{tab} =$ accept H_0.

19) Z test α Values.

	Two Tail	1 tail
5%	1.96	1.645.
1%	2.58.	2.33
2%	2.33	
10	1.645.	

$\mu =$ small val
$\bar{x} =$ big val.

Given : $n_1, n_2, \bar{x}_1, \bar{x}_2$, SD (diff). $n > 30$

(1) Go for Z test with diff of Means

(2) (a) $H_0 = \mu_1 = \mu_2$.

(b) $H_1 = \mu_1 \neq \mu_2$ (2 tail)

$\mu_1 > \mu_2$, $\mu_1 < \mu_2$ (1 tail) [if α is not written].

(c) $\alpha = 0.05 = 1.96$ (2 tail)

(d) TS = $\boxed{Z = \dfrac{\bar{x}_1 - \bar{x}_2}{\sqrt{\dfrac{\sigma^2}{n_1^2} + \dfrac{\sigma^2}{n_2^2}}}}$

(e) $|Z_{cal}| < Z_{Tab}$ Accept H_0.

(f) $|Z_{cal}| > Z_{Tab}$ Reject H_0.

Eg Researcher

Given : no mean, no SD, 1 sample, $n > 30$

(81) Given :

(1) Go for Z test for Single Prop.

$\boxed{P = \frac{x}{n}}$

(2) (a) H_0 : $P = 0.5$.

(b) H_1 : $P \neq 0.5$ (2 tail). [P (in Ques)]

$P > 0.5$ or $P < 0.5$ (One tail)

$\boxed{Q = 1 - P}$

(c) L.O.S = 5%.

(d) TS = $\boxed{Z = \dfrac{p - P}{\sqrt{\dfrac{PQ}{n}}}}$

P = pop prop.

p = sample prop.

(e) $|Z_{cal}| \leq Z_{table}$ accept H_0

Eg:- Rice eaters
Defective —— $P > 0.04$
1 tail.

82). Given:- no mean no SD, 2 samples
(1) Go for Z test for diff of prop.
(2) $H_0: P_1 = P_2$ ~~2 tail~~

$H_1 = P_1 \neq P_2$ (2 tail)

$P_1 > P_2$ (1 tail).

$\boxed{P_1 = \frac{x_1}{n_1}}$

$\alpha = 5\%$.

$$\boxed{TS = \frac{P_1 - P_2}{\sqrt{PQ\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}}$$

$$\boxed{P = \frac{x_1 + x_2}{n_1 + n_2}}$$

$$\boxed{Q = 1 - P}$$

Z val < Z table accept H_0.

Eg:- transistors
defective Articles

$$\boxed{\frac{P_1 - P_2}{PQ\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Eg
%
fair hair

If % given then $P_1 = \frac{20}{100} = 0.2$.

$Q_1 = 1 - P_1$
$= 1 - 0.2$.

$$\boxed{\Rightarrow \frac{P_1 - P_2}{\sqrt{\frac{P_1 Q_1}{n_1} + \frac{P_2 Q_2}{n_2}}}}$$

	Mean	Var
cont Ran Var	$\mu = \int_{-\infty}^{\infty} x \cdot f(x)\,dx$	$\sigma^2 = \int_{-\infty}^{\infty} x^2 f(x)\,dx$
2M, SD, Independent events	$\mu = E[X] - E[Y]$	$V[X]^2 + V[Y]^2$
2M, SD, Co-Relation	$\mu = E[X] - E[Y]$	$V[X]^2 + V[Y]^2 - 2\,cov(x,y)$

T-test — DOF $= n-1$

no varience — $\boxed{t = \frac{\bar{x} - \mu}{s\sqrt{n-1}}}$

~~no S.D~~ — $\bar{x} = \frac{\Sigma x}{n}$

Single Mean — $\boxed{|t| = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}}$

diff of Means — $|t| = \frac{\bar{x}_1 - \bar{x}_2}{s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$

x	$x-\bar{x}$	$(x-\bar{x})^2$

$SD = \frac{\Sigma(x-\bar{x})^2}{n-1}$

$SD = \sqrt{}$

$g = \frac{s}{\sqrt{n}}$

diff of sig — F test

$s_1^2 = \frac{\Sigma(x-\bar{x})^2}{n_1 - 1}$

$s_2^2 = \frac{\Sigma(x-\bar{x})^2}{\cancel{n_2 - 1}}$

$x - \bar{x}$

$\frac{\Sigma(x-\bar{x})^2}{n_1 - 1}$

$x - \bar{x}$

$\frac{\Sigma(x-\bar{x})\frac{\Sigma x}{n}}{n_1 - 1}$

$\sigma_1^2 = \sigma_2^2$.

$$\boxed{F = \frac{S_1^2}{S_2^2}}$$

DOF = F_{Tab}

X Chi

XL

Z	T	F
↓	↓	↓
4	2	1.
SM	SM.	DOV.
DOM.	DOM	
SP.		
DOP.		

↓.

	2	1
5	1.96.	1.645
1	2.58.	2.33.
2		
10.		

Ztest

Single Mean.

$$\boxed{Z = \frac{\bar{x} - \mu}{\frac{S}{\sqrt{n}}}}$$

g

g

DOM

$$\boxed{\frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\sigma_1^2}{n_1^2} + \frac{\sigma^2}{n_2^2}}}}$$

SPr

$\frac{x}{n}$

$$\boxed{Z = \frac{p - P}{\sqrt{\frac{PQ}{n}}}}$$

$\frac{x_1}{n_1}$ +

σ

σP

σ^2

$S \sqrt{\sigma}$.

$$\boxed{Z = \frac{P_1 - P_2}{\sqrt{PQ\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}}$$