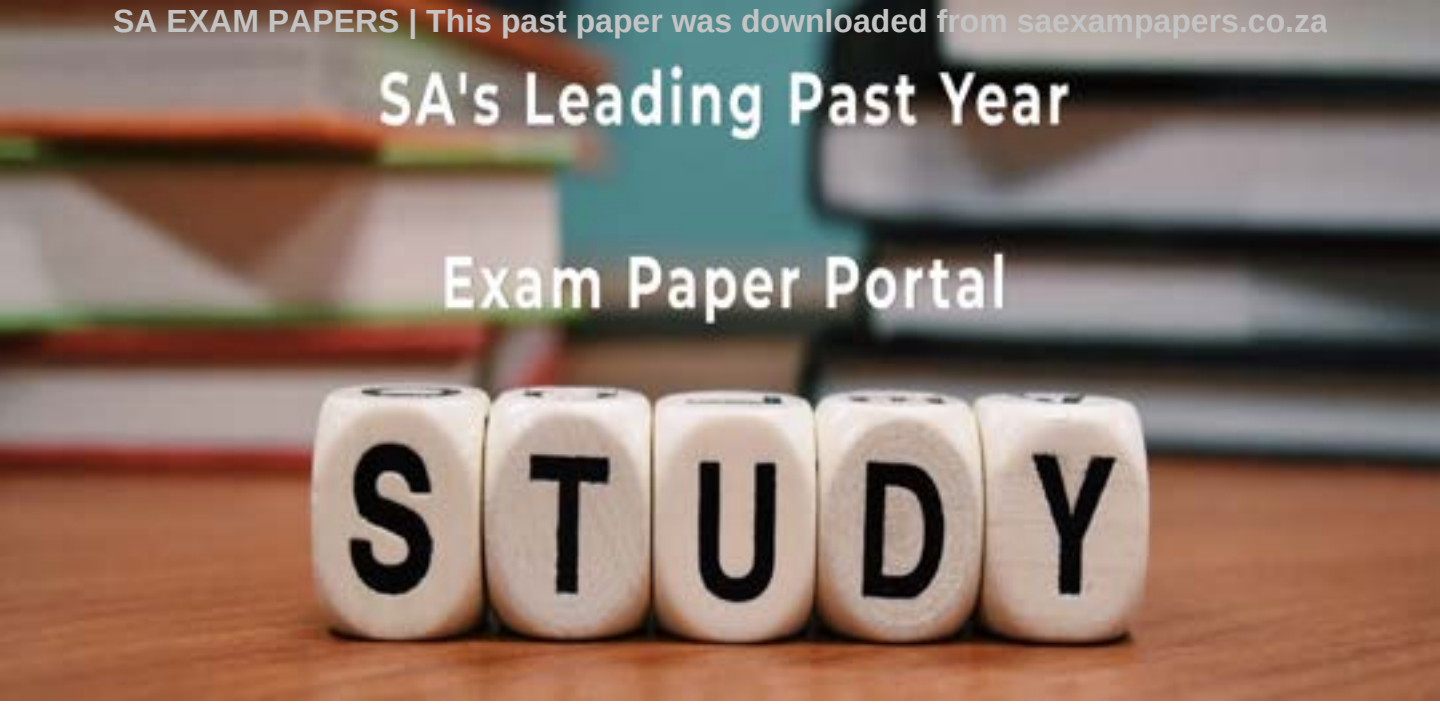

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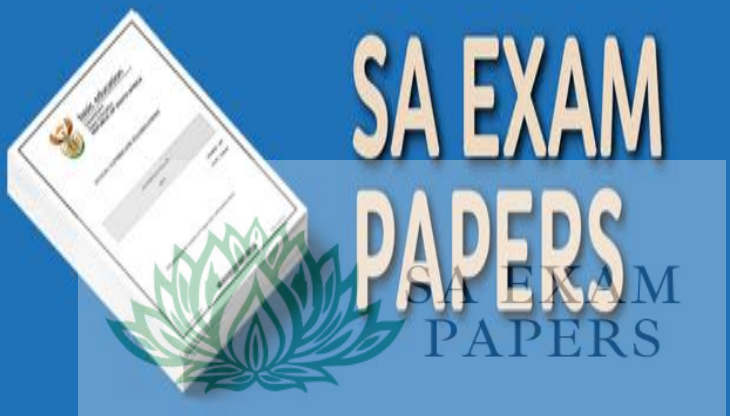


Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Department van Onderwys
Porafensie Ya Kapa Botjahabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE

KEREITI 12

LOETSE 2024

MMETSE P1

MATSHWAO: **150**

NAKO: **Dihora tse 3**

Pampiri ena e na le maqephe a 13 ho kenyelletsa
le leqephe le 1 la tlhahisoleseding.

DITAELO LE TLHAHISOLESEDING

Bala ditaelo tse latelang ka tlhoko pele o araba dipotso.

1. Pampiri ena e na le dipotso tse 12.

2. Araba dipotso TSOHLE BUKENG YA HO ARABELA E KGETHEHILENG.

3. Bontsha ka ho hlakileng dikhaltjhuleishene, didayakeramo, dikerafo TSOHLE, jwalo jwalo tseo o di sebedisitseng ho fumana dikarabo tsa hao.

4. O ka sebedisa saentifikhi khaltjhuleitha e dumelletsweng (e sa prokeremuwang le e se nang dikerafo), kantle le ha ho boletswe ka tsela e nngwe.

5. Dikarabo FEELA di ke se abelwe matshwao a felletseng.

6. Moo ho hlokehang, atametsa dikarabo ho didesimale TSE PEDI, ntle le haeba ho boletswe tse hlokehang.

7. Didayakeramo HA DI A latella ditekanyo tse nepahetseng.

8. Nomora dikarabo tsa hao jwalo ka ha dipotso di nomorilwe ho pampiri ya dipotso.

9. Leqephe la tlhahisoleseding le nang le difomula le kenyeleditswe qetellong ya pampiri ya dipotso.

10. Ngola ka mongolo o makgethe, mme o balehang.

POTSO YA 1

1.1 Solva *x*:

1.1.1 $(2x-4)(x-1)=0$ (2)

1.1.2 $2x^2-3(x+2)=4$ (atametsa ho didesemale tse PEDI) (4)

1.1.3 $x^2+4x-21\leq 0$ (3)

1.1.4 $-\sqrt{x-1}=3-2x$ (4)

1.2 Solva x le y simultaneously:

$2x=1-y$ le $xy-x^2+y^2=5$ (6)

1.3 O fuwe hore:

- $f(x)=x^2+3x$
- $2x-\left[t(x)\right]^{\frac{1}{2}}=0$

Ke divelu dife tsa k moo ekhweishene $f(-x)+\frac{t(2k)}{4}=0$ e tla ba le diruthi tse lekanang? (5)

[24]

POTSO YA 2

2.1 O fuwe khwadrathikhi namba phathene: –5; – 4; –1; 4; ...

2.1.1 Fumana n^{th} themo ya khwadrathikhi namba phathene ka mokgwa wa $T_n = an^2 + bn + c.$ (4)

2.1.2 Khaltjhuleitha 35^{th} themo ya khwadrathikhi namba phathene. (1)

2.1.3 Ke di-consecutive themo dife tse PEDI tsa first differences sequence tse tla ba le product ya 1 155?? (4)

2.2 O fuwe arithimethikhi sekhwense: 60; 65; 70; ...

Khaltjhulietha velu ya p moo $T_p = 430$. (3)

2.3 Sum ya dithemo tse tharo tsa pele tsa increasing arithimethikhi sirisi ke 30 mme product ya dithemo tsona tseo tse tharo ke 510. Fumana divelu tsa *a* le *d*, themo ya pele le khomone diferense ka tsa sirisi ho latellana. (5)
[17]

POTSO YA 3

3.1 Infinite Jiomethrikhi sirisi e na le themo ya pele e leng 2 le khonstente reshio ya $\frac{1}{3}$.

3.1.1 Khaltjhuleitha dithemo tse pedi tse latelang. (1)

3.1.2 Khaltjhuleitha velu ya S_∞. (2)

3.2 Fumana velu ya m haeba:

$$\sum_{k=3}^{m} 8(2)^{k-1} = 131\ 040$$

(5)
[8]

POTSO YA 4

Ithute fankhshene: $f(x)=\frac{-1}{x+5}-2$

4.1 Ngola diekhweishene tsa diasymptote tsa f. (2)

4.2 Fumana dikhoodineithe tsa x-inthasepthe tsa f. (2)

4.3 Fumana dikhoodineithe tsa y-inthasepthe tsa f. (2)

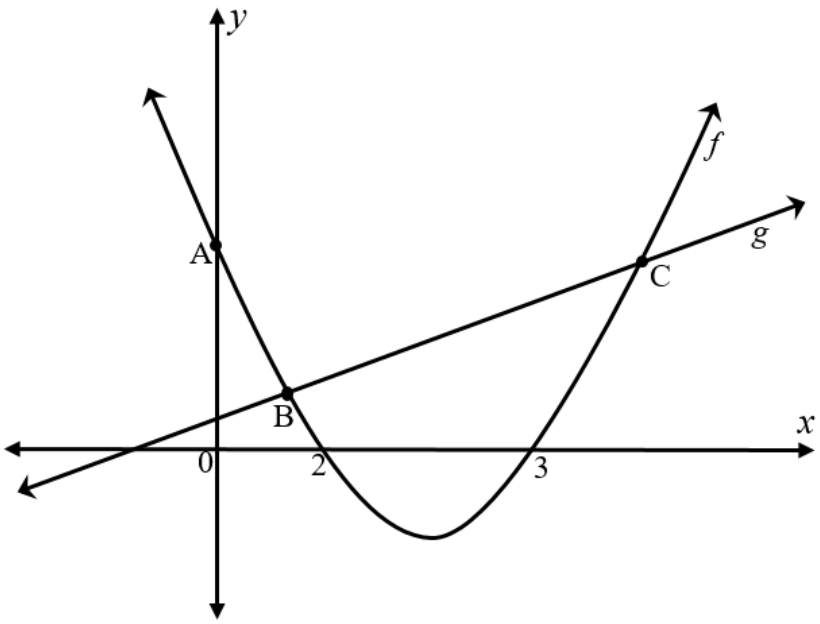
4.4 Etsa sketch sa kerafo ya f, bontsha ka ho hlakeleng kaofela diasymptote le di-inthasepthe ho di-eksis. (3)

4.5 Fumana ekhweishene ya axis of symmetry e nang le keradiente ya –1. (2)

[11]

POTSO YA 5

Dikerafo tsa $f(x)=x^2-5x+6$ le $g(x)=x+1$ di teroilwe. B le C ke dipoente tsa inthasekshene dipakeng tsa f le g. Kerafo ya f e na le di x-inthasepthe ho $(2;0)$ le $(3;0)$ y-inthasepthe ho A.



5.1 Fumana ekhweishene ya axis of symmetry ya f. (2)

5.2 Khaltjhuleitha dikhoodineithe tsa B le C. (4)

5.3 PQ ke vertical distance e dipakeng tsa dikerafo g le f dipakeng tsa B le C. Fumana maximum length ya PQ. (4)

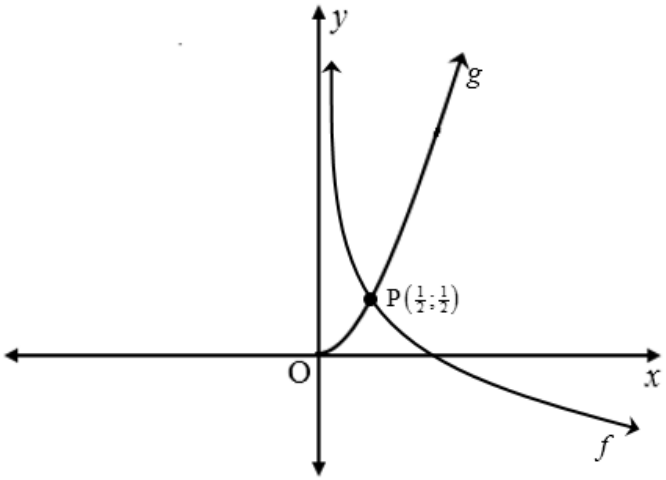
5.4 Fumana reinje ya $t(x)$ haeba $f(x)-2=t(x)$. (2)

5.5 Ke divelu dife tsa x moo $f(x).g'(x)<0$? (2)

[14]

POTSO YA 6

Dayakeramo e latelang e bontsha dikerafo tsa $f(x) = -\log_c x$ le $g(x) = d\,x^2$; $x \geq 0$.
Poente P $\left(\frac{1}{2};\frac{1}{2}\right)$ ke poente ya inthasekshene ya dikerafo f le g.



6.1 Khaltjhuleita divelu tsa c le d. (3)

6.2 Fumana:

6.2.1 Ekhweishene ya $g^{-1}(x)$ ka mokgwa ona $y = \ldots$ (2)

6.2.2 Ekhweishene ya $h^{-1}(x)$ ka mokgwa ona $y = \ldots$, haeba h ke reflekhshene ya f ho x-eksis. (2)

6.2.3 Divelu tsa x moo $h^{-1}(x) > 0$ (1)
[8]

POTSO YA 7

7.1 Koloi e boleng ba R180 000, e diphresheitha ka 13% p.a. compounded annually ho reducing balance method. Khaltjhuleitha velu ya koloi dilemong tse 6 tse tlang. (3)

7.2 Lumi o butse savings plan account ya dilemo tse 15 year e lefang interest ya 8% ka selemo compounded monthly. O boloka R900 ka kgwedi ho dilemo tse 10 tsa pele. Tefo ya hae ya pele e bile mafelong a kgwedi ya pele. Dilemong tse 5 tsa ho qetela tsa savings plan ya hae oile a kgona ho nyolla tjhelete a e lefang ka kgwedi hoya ho R1 300.

Khaltjhuleitha velu ya savings tsa hae mafelong a nako. (5)

7.3 Mr Leanya o rekile ntlo ka R850 000. Oile a fumana loan ho tswa bankeng ka interest rate ya 13% per annum compounded monthly ho lefa ntlo. Oile a dumela ho lefa monthly instalments ya R9 958,39 ho fehlella ho dilemo tse 20.

7.3.1 Khaltjhuleitha balance ya loan ya hae hang ka mora 75^{th} instalment. (3)

7.3.2 Mr Leanya o tobane le mathata a tjhelete ka mora 75^{th}instalment mme a se ke a kgona ho lefa76^{th} ho ya ho79^{th} instalments. Ka mora kgwedi ya bo 80^{th} oile a nyolla monthly instalment hotle a qete ho lefa loan ka nako e neng e behilwe tshimolohong.

Khaltjhuleitha velu ya adjusted monthly instalment entjha. (5)
[16]

POTSO YA 8

8.1 Fumana $f'(x)$ ho tswa ho difirst principle haeba $f(x)=x^2-3$. (4)

8.2 Fumana:

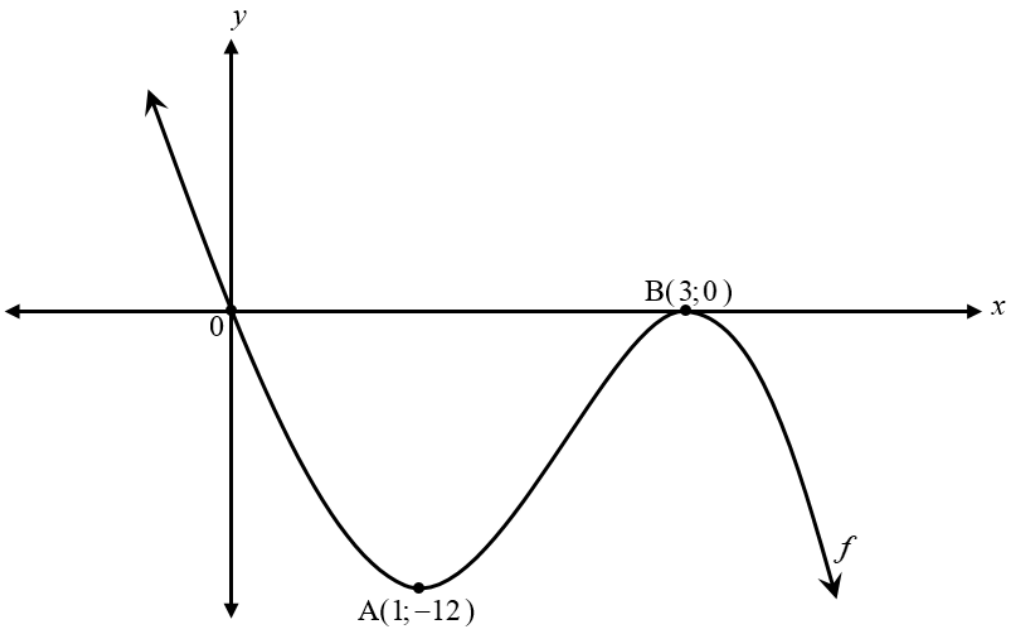
8.2.1 $\frac{dy}{dx}$ haeba $y=-3x^2+7x$ (2)

8.2.2 $D_x\left[\frac{x^3-5x^2}{x^3}-\sqrt{x}\right]$ (4)

8.3 Ebang hothwe $g(x)$ o emetse rate of change ya $h(x)=-x^3-3x^2+1$. Khaltjhuleitha velu e kgolo ya $g(x)$. (3)
[13]

POTSO YA 9

9.1 Sketch se latelang se bontsha kerafo ya $f(x) = -3x^3 + mx^2 + nx$. Kerafo ya f e feta ho orijine mme e na le local minimum le local maximum ho $A(1;-12)$ le $B(3;0)$ ka ho latellana.



9.1.1 Bontsha hore $m = 18$ le $n = -27$ (5)

9.1.2 Hlalosa phapano dipakeng tsa $f(a)$ le $f'(a)$. (2)

9.1.3 $g(x)$ ke thanjente ho curve $f(x)$ ho poente ya inflekhshene. Fumana ekhweishene ya $h(x)$, setereite laene se phephenditjhula ho $g(x)$ se fetang ho orijine. (5)

9.1.4 Ke divelu dife tsa x moo $f''(x) > 0$? (2)

9.2 Fankshene t e filwe e le $t(x) = 2x^3 + bx + c$ mme e na le diphrophathi tse latelang.

- $t(-3) = t(3) = t(0) = 0$
- $t'(-1,5) = t'(1,5) = 0$

Sebedisa dintlha tse ka hodimo ho teroya ka makgethe mme o leibole sketch gragh sa t, ntle le ho solva b le c. (3)

[17]

POTSO YA 10

Lenane la dipampiri tse tshwauweng ke motshwai ya itseng le fumanwe sebakeng sa ho tshwahela kamora matsatsi a t ho qadile ho tshwauwa, mme e bontshitswe ka fankshene, $S(t) = -3t^2 + 30t$, $1 \leq t \leq 10, t \in \mathbb{Z}$, moo $S(t)$ e lekanyetswa ka dipampiri ka letsatsi.

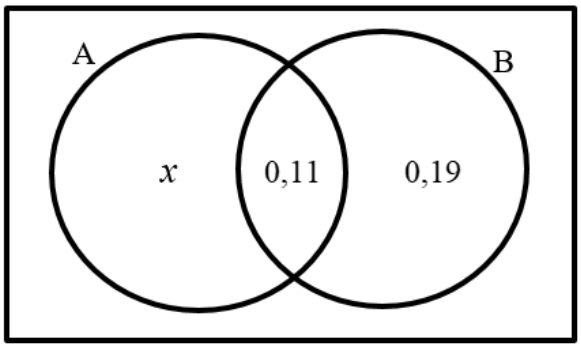
10.1 Fumana lenane la dipampiri tse tshwauweng ke motshwae ka letsatsi la boraro. (2)

10.2 Ke letsatsi lefe moo motshwai a tla fumana maximum number ya dipampiri tse tshwauweng ka letsatsi? (3)

10.3 Lenane le felletseng la dipampiri tseo motshwai a neng a tlameha ho le tshwaya matsatsing a 10 ke 500. Ana motshwai o ile a tseba ho fihlella ho tekanyetso e neng e behilwe ya dipampiri? Tshehetsa karabo ya hao ka dikhaltjhuleishene. (2)
[7]

POTSO YA 11

11.1 Di-evente tse pedi A le B di bontshitswe ho Venn diagram e ka tlase.
Ho nehilwe hore P[eseng (A kapa B)] = 0,41.



Fumana:

11.1.1 Velu ya x onto fumana P(A) (2)

11.1.2 P (A or not B) (2)

11.2 Diphetho tsa dipapadi tse 30 tsa sehlopha sa bolo ya maoto, City Brothers FC ka sehla sa 2022–2023 se bontshitswe ka tlase.

	HOME GAME	AWAY GAME	TOTAL
WINS	3	4	7
LOSSES	7	7	14
DRAWS	5	*a*	9
TOTAL	15	15	30

11.2.1 Ngola velu ya *a*. (1)

11.2.2 Ke probability efe moo papadi e randomly selected ya City Brothers FC e bileng sehlopha se hlotsweng? (1)

11.2.3 Ekaba di-evente 'winning a game' le 'playing at the home ground' di independent? Tshietsa karabo ya hao ka dikhaltjhuleishene. (3)
[9]

POTSO YA 12

Provinse ya Kwazulu-Natal e ile ya hlahisa number plate system e ntjha ho tloha ka Tshitwe 2023. Number plate code e ntjha ena le ditlhaku tse pedi, di-dijithi tse pedi ha mmoho le ditlhaku. System e sebedisa di-dijithi, 0–9 le ditlhaku tsa alfabethe ntle le divowele. Mohlala o ka tlase ke wa number plate e ntjha. Hlokomela hore dinumber plate kaofela di qetella ka ZN ileng code e ekemetseng.

[Source: KZN Provincial Gazette 2614-lipoleiti tse ncha tsa linomoro tsa KZN]

12.1 Ke dinumber plate code tse kae tse ka bang possible ho system e ntjha, ebang di-dijithe le ditlhaku di sa phetaphetwe? (2)

12.2 Khaltjhuleitha probability ya hore number plate code e tla qala ka tlhaku ya alfabethe ka pele ho G, moo dijithi ya pele e leng composite number mme digithi ya hoqetela ke fektha ya 4. Di-digithi le ditlhaku di se phetaphetwe. (4)
[6]

MATSHWAO KAOFELA: 150

PAMPIRI YA TLHAHISOLESEDING: MMETSE

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1+ni) \qquad A = P(1-ni) \qquad A = P(1-i)^n \qquad A = P(1+i)^n$$

$$T_n = a + (n-1)d \qquad S_n = \frac{n}{2}\left(2a + (n-1)d\right)$$

$$T_n = ar^{n-1} \qquad S_n = \frac{a\left(r^n - 1\right)}{r-1} \; ; \quad r \neq 1 \qquad S_\infty = \frac{a}{1-r} \; ; \; -1 < r < 1$$

$$F = \frac{x\left[(1+i)^n - 1\right]}{i} \qquad P = \frac{x\left[1-(1+i)^{-n}\right]}{i}$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \mathrm{M}\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

$$(x-a)^2 + (y-b)^2 = r^2$$

In ΔABC: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$ $\qquad a^2 = b^2 + c^2 - 2bc.\cos A$ $\qquad area\,\Delta ABC = \dfrac{1}{2}ab.\sin C$

$$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta \qquad \sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$$

$$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta \qquad \cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$$

$$\cos 2\alpha = \begin{cases} \cos^2\alpha - \sin^2\alpha \\ 1 - 2\sin^2\alpha \\ 2\cos^2\alpha - 1 \end{cases} \qquad \sin 2\alpha = 2\sin\alpha.\cos\alpha$$

$$\bar{x} = \frac{\sum x}{n} \qquad \sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)} \qquad P(A \text{ kapa } B) = P(A) + P(B) - P(A \text{ le } B)$$

$$\hat{y} = a + bx \qquad b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}$$