

GOSFORD HIGH SCHOOL

2008
YEAR 12 TRIAL HIGHER SCHOOL CERTIFICATE

MATHEMATICS EXTENSION 2

General Instructions:

- Reading time 5minutes
- Working time 3 hours
- Write using black or blue pen.
- Board-approved calculators may be used
- A table of standard integrals is provided at the back of this paper
- All necessary working should be shown in every question.

Total marks: - 120

- Attempt Questions 1 -8
- All questions are of equal value.

Question 1. (15 marks) use a SEPARATE writing booklet

Marks

a) Show that $x^2 \sin x$ is an odd function and hence find $\int_{-1}^{1} \pi - x^2 \sin x \, dx$

2

b) Find
$$\int_{-1}^{0} \frac{1}{x^2 + 2x + 2} dx$$

3

c) Find
$$\int \frac{4x^2 - 3x - 4}{x^3 + x^2 - 2x} dx$$

3

d) Using the substitution $u = a \sin \theta$ find $\int \sqrt{a^2 - u^2} du$ where a is a constant and |u| < a.

3

e) Find
$$\int e^{2x} \sin 3x \, dx$$

4

Question 2. (15 marks) use a SEPARATE writing booklet

a) If z = 3 + 4i and $\omega = 1 + i$ find in the form a + ib

i)
$$z + \omega$$

1

1

iii)
$$\bar{z}$$

1

1

v)
$$\frac{z}{\omega}$$

2

b) Find two numbers whose sum is 4 and whose product is 8.

2

Marks

c) If two complex numbers Z_1 and Z_2 are such that $|Z_1 + Z_2| = |Z_1 - Z_2|$

prove that $\frac{Z_1}{Z_2}$ is a pure imaginary number.

3

d) i) If $z = \cos \theta + i \sin \theta$ show $\cos n\theta = \frac{z^n + z^{-n}}{2}$ and $\sin n\theta = \frac{z^n - z^{-n}}{2i}$

ii) Hence or otherwise prove $\sin 4\theta + \sin 2\theta = 2\sin 3\theta \cos \theta$.

2

Question 3. (15 marks) use a SEPARATE writing booklet

a) i) Graph the function f(x) = 3 - |x-1|.

2

ii) Use your answer to part (i) to do neat, separate sketches of the following.

a) y = 3 - f(x)

1

$$\beta) \quad y = \frac{1}{f(x)}$$

2

$$\gamma) y^2 = f(x)$$

2

b) Show that $\lim_{\theta \to 0} \frac{1 - \cos \theta}{\theta} = 0$

2

c) The quadratic equation $z^2 + (1+i)z + k = 0$ has a root of 1-2i. Find, in the form a+ib, the value of k and the other root of the equation.

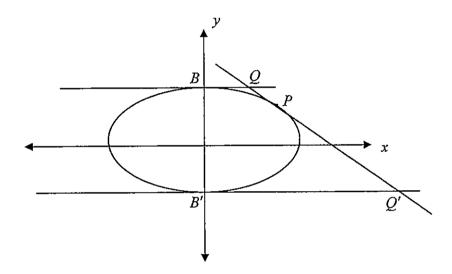
3

Marks

d) The region under the curve $y = \sin x$, bounded by the x axis and the ordinate $x = \frac{\pi}{2}$ is rotated about the y axis. By using the method of cylindrical shells find the volume of the solid generated.

3

Question 4. (15 marks) use a SEPARATE writing booklet a)



i) Show that $P(a\cos\theta, b\sin\theta)$ lies on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

3

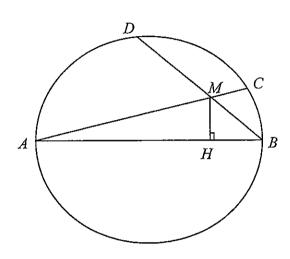
ii) This ellipse meets the y axis at B and B'. The tangents at B and B' to the ellipse meets the tangent at P at the points Q and Q' respectively. Prove that $BQ.B'Q' = a^2$

(you may assume the equation of the tangent at P is given by $\frac{x\cos\theta}{a} + \frac{y\sin\theta}{b} = 1$)

b) A particle of mass 12 kg rests on a smooth horizontal table, and it is attached by a string 1.2 metres long to a fixed point on the table. If the particle describes a horizontal circle at 3.6 m/s find the tension in the string.

2

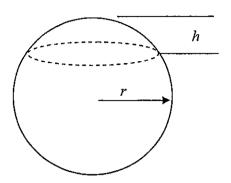
c)



AB is the diameter of a circle. Chords AC and BD intersect at M. H is a point on AB such that MH is perpendicular to AB.

- i) Prove that triangle ABC is similar to triangle AMH.
- ii) Show that AB.AH = AC.AM.
- iii) Prove that $AB^2 = AC.AM + BD.BM$

d)



The figure shows a "spherical segment" of height h cut off from a sphere of radius r by a horizontal plane. Show that its volume is

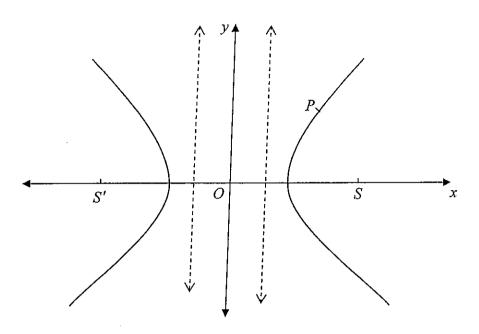
$$V = \frac{1}{3}\pi h^2 (3r - h)$$
 3

Question 5. (15 marks) use a SEPARATE writing booklet

- a) Sketch the graph of $y = \frac{2 + x x^2}{(x 1)^2}$ clearly showing any turning points and any asymptotes.
- b) When a certain polynomial is divided by x+1 and x-3 the respective remainders are 6 and -2. Find the remainder when this polynomial is divided by x²-2x-3.

c)

Marks



 $P(x_1, y_1)$ is a point on the rectangular hyperbola $x^2 - y^2 = a^2$. S and S' are the foci.

i) Show that the eccentricity is $\sqrt{2}$

1

ii) Using the focus directrix definition or otherwise show that

$$SP = \sqrt{2}x_1 - a$$
 and that $S'P = \sqrt{2}x_1 + a$

iii) Show that $SP.S'P = OP^2$, where O is the origin.

2

d) According to one cosmological theory, there were equal amounts of the two uranium isotopes ^{235}U and ^{238}U at the creation of the universe in the "big bang." At present there are $137.7^{238}U$ atoms for each atom of ^{235}U . Using the half-lives 4.51 billion years for ^{238}U and 0.71 billion years for ^{235}U , calculate the age of the universe.

3

Question 6. (15 marks) use a SEPARATE writing booklet

English Control

- a) Consider the equation $z^3 + mz^2 + nz + 6 = 0$, where m and n are real. It is known that 1 i is a root of the equation.
 - i) Find the other two roots of the equation.

ii) Find the values of m and n.

b) A railway track has been constructed around a circular curve of radius 500 metres. The distance across the track between the rails is 1.5 metres and the outer rail is 0.1 metres above the inner rail. The train travels on the track at a speed of v_0 m/s which eliminates any sideways force on the wheels.

i) Draw a diagram showing all the forces on the train.

ii) Show that $v_0^2 = 500g \tan \theta$, where θ is the angle the track makes with the horizontal.

iii) Taking $g = 9.8 \text{ m/s}^2$ calculate v_0 .

If the train travels on the track at a speed ν where $\nu > \nu_0$.

- iv) State which rail exerts a lateral force on the wheel at the point of contact.
- v) Draw a diagram showing all the forces on the train.
- vi) Show that the lateral force, F, exerted by the rail on the wheel is given by:

 $F = \frac{mv^2}{500}\cos\theta - mg\sin\theta$, where m is the mass of the train. 3

vii) Deduce that F is one fifth the weight of the train when $v = 2v_0$.

Marks

Question 7. (15 marks) use a SEPARATE writing booklet

a) The polynomial $P(x) = x^4 - 6x^3 + 13x^2 - ax - b$ has two double zeros α and β . Find a and b.

3

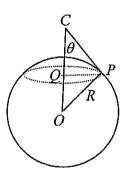
- **b)** A particle of mass m kg is projected vertically upwards from the ground with a velocity u m/s in a medium whose resistance is given by mkv^2 Newtons, where v is the speed at that instant (in m/s) and k is a positive constant.
 - i) Prove that the time taken to reach the highest point is $\frac{1}{\sqrt{kg}} \tan^{-1}(u\sqrt{\frac{k}{g}})$ seconds where $g \ m/s^2$ is the acceleration due to gravity.

3

3

ii) Prove that the greatest height reached is $\frac{1}{2k} \ln(1 + \frac{ku^2}{g})$ metres.

c)



A particle P of mass 2 kg at the end of a string of length l=1.3 metres is suspended from C a point vertically above the highest point of a smooth sphere centre O radius R=1.3 metres. P describes a horizontal circle of radius PQ=0.5 metres on the surface of the sphere.

i) If T is the tension in the string CP and N is the reaction of the surface of the sphere exerted on P show that:

$$\frac{mv^2}{r} = (T - N)\sin\theta \qquad \text{and} \qquad mg = (T + N)\cos\theta \qquad 3$$

ii) If there is no force exerted by the particle on the sphere find the velocity of P. (take $g = 9.8 \, m/s^2$)

Question 8. (15 marks) use a SEPARATE writing booklet

Marks

4

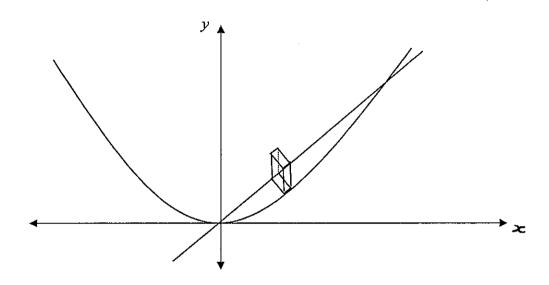
a) Show that the derivative of
$$y = x^{x+1}$$
 is $\left(1 + \frac{1}{x} + \ln x\right) x^{x+1}$.

b) Indicate on an Argand diagram the locus of the point P representing Z when

$$\arg\left(\frac{Z+1}{Z-i}\right) = 0.$$

c)

epolitical services



The base of a solid is the region in the first quadrant bounded by the graphs of y = x and $y = x^2$. Each cross section perpendicular to the line y = x is a square. Find the volume of the solid.

d)
i) Show that
$$\cos[(n-1)\theta + \theta] - \cos[(n-1)\theta - \theta] = -2\sin(n-1)\theta\sin\theta$$
.

ii) If
$$U_n = \int \cos n\theta . \csc\theta \ d\theta$$
, prove that $U_n - U_{n-2} = \frac{2\cos(n-1)\theta}{n-1}$.

iii) Hence or otherwise prove that
$$\int_0^{\frac{\pi}{2}} \frac{\cos 2\theta - \cos 8\theta}{\sin \theta} d\theta = \frac{142}{105}.$$

End of paper

STANDARD INTEGRALS

$$\int x^{n} dx = \frac{1}{n+1} x^{n+1}, \quad n \neq -1; \quad x \neq 0, \text{ if } n < 0$$

$$\int \frac{1}{x} dx = \ln x, \quad x > 0$$

$$\int e^{ax} dx = \frac{1}{a} e^{ax}, \quad a \neq 0$$

$$\int \cos ax dx = \frac{1}{a} \sin ax, \quad a \neq 0$$

$$\int \sin ax dx = -\frac{1}{a} \cos ax, \quad a \neq 0$$

$$\int \sec^{2} ax dx = \frac{1}{a} \tan ax, \quad a \neq 0$$

$$\int \sec ax \tan ax dx = \frac{1}{a} \sec ax, \quad a \neq 0$$

$$\int \frac{1}{a^{2} + x^{2}} dx = \frac{1}{a} \tan^{-1} \frac{x}{a}, \quad a \neq 0$$

$$\int \frac{1}{\sqrt{a^{2} - x^{2}}} dx = \sin^{-1} \frac{x}{a}, \quad a > 0, \quad -a < x < a$$

$$\int \frac{1}{\sqrt{x^{2} - a^{2}}} dx = \ln\left(x + \sqrt{x^{2} - a^{2}}\right), \quad x > a > 0$$

$$\int \frac{1}{\sqrt{x^{2} - a^{2}}} dx = \ln\left(x + \sqrt{x^{2} + a^{2}}\right)$$

NOTE: $\ln x = \log_e x$, x > 0

EXT 2. TRIAL 2008 SOLUTIO	
	42-32-4 = a(x+2)(x-1)+bx(x-1)+cx(x+1)
a) x2 Sinze	Ltx=1: -3 = 3c
odd if f(a) = -f(-a)	-1 = c
f(a) = a2 Siza	6+x=0: -4=-20
f(-a) = (-a) Sin(-a)	2 = 0
= G2 x - 51ma = - a2 51ma = - f(a)	let x = -2: 18 = 6b
= -a ² Sina	
- f(a)	
function is add.	$\frac{1}{12} \int \frac{4x^2 - 3x^2 - 44}{x^3 + 3x^2 - 22x} dx = \int \frac{2}{3x} + \frac{3}{3x + 2} \frac{1}{3x - 1} dx$
T - 2 Sinac da	$= 2\ln x + 3\ln(x+z) - \ln(x-1) +$
	= (x2(x+2)) +c
= \int T due - \int 2 Sinde Obe	$= 2\ln x + 3\ln(x+2) - \ln(x-1) + 2\ln \left(\frac{x^2(x+2)^2}{x-1}\right) + 4$
	d) (\sqrt{\sqrt{2}^2 - u^2} du
- π-(-π) - 2π	u = a5m0
<u>- 2 ग</u>	du - alose a/u
	du = alossede · Varia
b) dec	14-4
	= (C-C^4(, -4 C/5) A dA
$\int_{-1}^{0} \frac{1}{x^2+2x+1+1}$	= \ \ \(\alpha^{2} - \alpha^{2} \sigma_{10}^{4} \theta_{10}^{4} \theta_{10}^{4
	= a/ \a^2(1-Sin^2) Cus = a/0
- (3+1) ² +1	
= [_tao='(x+1)]	= 9 (a Coso, Coso do
= tan'1-tan'o	? 92 / Cosi & do
<u>- π</u> - +	= <u>c²</u> / <u>Cos2@ +1</u> do
$\frac{c) \int \frac{4x^2 - 3x - 4}{x^3 + x^2 - 2x} dx$, a2 51520+0
200 4x2-3x-4 4x2-3x-4	= a2 Sinb(600 +0)
$\chi^2 + \chi^2 - 2\chi \qquad \chi (\chi_{+2})(\chi_{-1})$	
let	: 62 L. (a-u + Sis-1 (in))
4x2-3x-4 a + b + c	
$\frac{1}{2}(2+2)(2-1) = \frac{2}{2} + \frac{2}{2} + \frac{2}{2} = \frac{2}{2}$	= = (L \ \a^2 - L^2 + a^2 Sin (\ \frac{u}{a}) + c

· · · · · · · · · · · · · · · · · · ·		· ·
e) $\int e^{2z} - \sin 3x dx$	V) 3 = 3+40 1-0	
	7-6	
[= fil (te)Sin3x doc	3-3: +4: + 4	.
= 12e2 Sin 3x - 52e2 . 3(653x dec	= 7+ <u>i</u>	— —
= 2e201 Sin3x - 3 Je Cos3x doc	, 글 + <u>호</u> ,	
= 12 22 Sin3x - 3 de (12e2), (23xd2	b) let the numbers	
1 2x - 3 1, 2x - 0; [1 20] - 7	01b=4·!	
= 2 e Sin3x - = 2 2 2 Cos3x - 5 e - 3 Sin3x cos	3) 8 = do	
1 22 - 9 22 -	① ⇒ b=4-a	
= 2e25113x - 7e2 G33x - 7 E2 Sin3x dec	Znp inje (33	
	a(4-e) = 8	
= 52 5103x - 7 e c c c 3x - 7 1	40-02 = 8	
	a2-4a+8=0	
: 41 = 2e2 5113x - 4e2 653x	Q = 4 ± 16-32	·
1 = 13 (2e)m3x-5e (6832)	= 4 ± √-16	
$ \frac{1}{1} = \frac{1}{13} \left(\frac{1}{2} e^{2x} S_{1} + \frac{3}{2} e^{2x} \left(\frac{3}{2} e^{2x} \right) \right) $ $ \frac{2\pi}{13} \left(\frac{2}{2} S_{1} + \frac{3}{2} e^{2x} \left(\frac{3}{2} e^{2x} \right) \right) + \frac{2\pi}{13} \left(\frac{3}{2} e^{2x} + \frac{3}{2} e^{2x} \right) + \frac{3\pi}{13} e^{2x} \left(\frac{3}{2} e^{2x} + \frac{3}{2} e^{2x} \right) $		
	- 4440	
() 3= 3+4i , w = 1+i	= 2±2i = 2 numbers are 2+2i 2-2i	
a) 3= 3+4i, w = 1+1	- 2 numbers are	
<u>i) 34w</u>	2+26, 2-26	
i) 34w = 4+5 L		
	c) Z, +2. = Z, -2.	
ii) <u></u>		
= (3+4i)(17i)	W z = a. + iy, , z = 26	<u> - iga - </u>
= 3+3i+4i-4	1	
÷ -1 + 7ċ	$\sqrt{(x_1+x_2)^2+(y_1+y_2)^2} = \sqrt{(x_1-y_1)^2}$	-) <u>-</u> +(4,=4;
iu)	22,22 + 24,42 = -22,2	<u>2 - 24,4,</u>
= 3-40	42,2, +44,7, = 0	
	2422 44,7 30	
(v) [3]	11-12-13-13-13-13-13-13-13-13-13-13-13-13-13-	
(v) S (x + 42		
•		

•	
3	·
z, z,+ij,	= Sin 48 + Sin 28
Z	
- x,+i4, x=i42	03)
Marine Za-iya	a) i) $f(x) = 3 - x-1 $
x,262-631,42+6729, +41/2.	3
a; + 4;-	
- 22×+414×+ F(2541=214F)	
x + 4 1	-3 -2 -1 1 2 3 4
	-3 -2 -1 1 2 2 4
but x1x2+ 4, 4 = 0	<u>V</u>
マディル。 - <u>テ</u> (コアイ*=エゲロア)	(i) a) 4=3-f(2)
which is a pure imaginary number	= 3-(3- 2i-)
	2 20-1
<u>d)</u>	- EA
(i) lest z = Coso + i Sino) = 2 = (Coso + i Sino) *	
3" = ((a) + isine)"	
d) (i) let z = Coso + i Sino (i) let z = Coso + i Sino 3" = (Coso + i Sino)" (coso + i Sino (1)	1 2 3
:150 3-7 = <u>Cos(-n)0 + C Sin(-n)0</u>	
= Cosno-isinno 12	0
0n	β) <u>y</u> = <u>f</u> (z) <u>1</u>
(1) - ty 3 - 7 - 2 Cosn 0	34
Cosno = 3" +2-"	
Siàno = 3" - 3" - 3"	3
	1 2 3
ii) Sin40+51020 = 25in30 Cuso	
$= 2 \left[\frac{2^3 - 3^{-3}}{3^2} \right] \left[\frac{3 + \frac{1}{3}}{3^2} \right]$	
21 / 2	
3"+3"-3"-3"	11 11
2L	
= 3 ⁴ -3 ⁻⁴ + 3 ² -3 ⁻²	
<u> کان کان </u>	
- 215, nue - 20 Sin 20	
21 21	. Land to the control of the control
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x) y2 = f(26)	Volume of shell = 2 Tish
	77
	ν = <u>Σ 2πα</u> γ Δα
	1 = 1 m & 277 xy Ast.
-2 -1 1 2 3 4	
	= 271 / Juy doc
+	
1- Coso	= 2.71 (2. Since doc
_ b) _ lm _ 1 - Cos 0	70
- Im 1-600 1+600	= 2.75 (1/2 x toc (- cosse) da
O→0 O 1+6050	7 a
. Jim 1- (45) to	-2-17 (-X Cosx - [-(usuc doc))
Ø→0 Ø(1+(6±0)	
= lin Sin20	= 27 (-x (asx + 5 mz))
θ→0 θ(1+650)	·
- lim Sino lim Sino	-27 [(0+1) - (0+6)]
0-30 · 0 · 3-30 +(6:0-	= 7
	= 211 cubic Units
	94)
	a b a b
$\frac{2}{3^2+(1+i)^2+k}=0$	sub (a coso, b sino)
1-22 is a root	20 (20) 20 - 12 Sm2 6 - 1
$\frac{1}{(1-2i)^2+(1-2i)(1-2i)+k=0}$	Ct b
1-41-4+1-26+6+2+2=0 -56+12=0	(as' 0 + Sin' 0 = 1
k = 50) -)
let a be the other root	. the point lies on the ellipse
	is for p: y=b 0
. d = -2+i	x (40 + 55140 -= 1(25
	G B
(d) 47	Sub(1) into (2) x (650 → 51NO = 1
,	
5 (2,79)	x =a(1-Sin b)
	<u>C₀5θ</u>
δυ T/2	· · · · · · · · · · · · · · · · · · ·
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· · · · · · · · · · · · · · · · · · ·	
	asymptote:
<i>y</i> 3 3	Vertical: a=1
	other. Im 2+2-222
$= \pi \left[r^{2} - y^{3} \right]^{\frac{1}{2}}$	ノC-3 db
L 3 1r-h	25-300 25-30-1
	25-7 00 22/22-225-4/22
$=\frac{1}{2\pi}\left[\left(\frac{1}{2}-\frac{3}{2}\right)-\left(\frac{1}{2}\left(\frac{1}{2}-\frac{1}{2}\right)-\left(\frac{1}{2}-\frac{1}{2}\right)\right]$	X-,
	= = =
= 7 2 r3 - r3+rh + r3-3rh+3rh+13	1
- · ·	4 intercept: 2.
$=\pi\left[\frac{r^{2}+r^{2}h+r^{2}}{3}-r^{2}h+rh^{2}-\frac{h^{2}}{3}\right]$	ist intercept: si-x-2=0
- 3	(1-2)(2+1) =0
= 1 (-r3 +3r2 h+r2-3r2h+3rh2+b3)	21 = 2, -1
3 (34/1
$=\frac{\pi}{3}\left(3rh^2-h^3\right)$	3 //\
$=\frac{\pi h^{2}}{3}(3r-h)$	7
<u> </u>	
<u>(05)</u>	3-3/1 2 3 4 5 6
a) $y = 2+2-2^{2}$	
(x-1) ^L	<u> </u>
$\frac{dy}{dx} = \frac{(2x-1)^2(1-2x) - 2(2+x-x^2)(x-1)}{(x-1)^4}$	
doc (x-1)4	
= (26-1) (1-202) -2(2+0(-02))	b) let P(x) = (x2-201-3)Q(x) + 9x
(x-1) ⁴	$P(x) = (x+1)(x-3) \varphi(x) + cx+1$
- (x-1) (x ² -2x ² -1+2x-4-2x+2x ²)	P(-1) = 6
(x-1) ⁴	- a +b = 6 (1)
= (x-1)(x-5)	P(3) = -2
(x-j)*	3a+b=-22
- <u>2~5</u> (2-i) ³	(v) -(2) -4a =8
	a =-2
Turning point when dy =0	Sub a == 2 into (1)
$(x-\xi)$	p = +
(x-1)3	· remainder -2x+4
: x= 5.	
1'(4) <0	
f'(6) >0	
:(K-91) mi	

for 0' - y= -b (1)	i) AAB< III AAH
2(050 + 45ino = 1 - (2)	LA is Commen
9 6	KAHM = 90° given
Sub(1) of a color	LACB =qu" AB a diameter
or Costa _ lo Sinta	angle in a Semicircle.
~	ABC AMA (A.A.A.)
1 x = a(1751n0)	
	(ii) fro (i) ABC AMH
······································	AB - AG
Cus @	AB = AC. AM AH
	ABAH = AM.AC(1)
: BD = Q(1-Sin B)	
$\frac{1}{100} = \frac{1}{100} = \frac{1}{100}$	isi) A BAR III A BMH
	LB Common
13'0' = 9(1+Sine)	L BAM = 90° given
13'0' = a(1+Sino) Cose	< BOA = 90' angle in a Semi circl
	AB BD
$\frac{BQ.B'Q' = Q(1-Sin\theta),Q(1+Sin\theta)}{Cos\theta}$	BM BH
<i>θεω θεω σ</i>	AB.BH = BM.BD(2)
- G1 (1-SIN28)	Now
- G ² (1-S ₁ η ² θ)	(1) +(2) AB (AH+BH) = AM. AC +BM. BD.
- a² (os² 0 - a² (os² 0	AB2 = AC. AM +BM. BD.
⊕'2∞	, , ,
= a²	()(1)
	(3(,4)
	(x,y)
·	
= 12 × 3·6	22-492=7-
12	
= 129.6 N.	Volume of a slice = TX2 Dy
·	• •
	V = Σ π x 2 4 y
	Velim Z TI Ay
A H B	
	= / x2 dy

.

·	
(24, 41)	d) let M235 = M0 e-kt M236 = M0 e-ct
(24,41)	,
	· · ½= e -4.51c
5' 5	6, 2 = -0.71 k 6, 2 = -451 c
3	. K = 0.9736, C= 0.1537
	•
	· . M = M = 0.9736t, M = 10.1537t
-9, 9/4	1 1 235 = 1 1 0 2 1 1 2 38 = 10 2
i) $x^2 - y^2 = a^2$	Now M238 = 137.7 123
$b^{2} = c^{2}(e^{2}-1)$	M. e-1.15316
but b=a	Now M ₂₃₈ = 137.7 M ₂₃ M ₆ e ^{-0.1537} t M ₇ e ^{-0.4136} t = 137.7
Pr = Pr (er -1)	
1 = = 2 -1	e. 8126t = 137.7
1 = E ² -1	t = ln137.7
	0.855%
E - 1/2,	= 5.99 billion years.
ii) by definition	(P6)
5p = ePM = e(x, - %.)	a) 33+m32+n2+6=0
- 2 (2, - 'a)	
= 12(2, - 9)	(i) m,n real => 1+i is a noot.
	1+3 may be a
= \2x, -a.	(1+i)(1-i)=-==================================
	7-1-6
0150 5'P = EPM'	2× =-6
= 12 (2, + 72)	other noots 1+i,-3
= 12x, +a.	3 Mer 10013 110, 3
	D/
$\frac{1}{2} \frac{1}{2} \frac{1}$	(c) 1+(+1-t-5-70
= 2x2-02	
Now	1 = m
OP' = 01, +4, - 1,+4,=	$\frac{1}{3}$ is a root $\frac{1}{3}$ $\frac{1}$
= x + x - a 4 = x = x	1 (-3) + (-3) + 3n +6 =0
= 22,2-02	-12 -3n =0
	3n = -12
' 5(5'f = OP	n = -4.
	1. m = 1, n = -4
*	
the second secon	

		8
b)	\	W An
	500 m	
····		7 mu ^c
	h 6	
<u> </u>		mg
	/	3
	→ mu ^c	
	9	N. (i) N. W. S. M.
		77500
	Mq	FSIND
		=
	<u>/</u> !~	
<u>ii)</u>	61 n Coso	Vertically:
	NSIMB	
		N Case = FSIME +mg
		N Cas 0- F Sind = mg(1)
·		hovizantally
		NSING + FCOSO = mu (2)
Varticall	<u>4:</u>	
	N (as 0 = mg ()) 1) x Smo: NJING (ws a - F Sin = = rng Sina - 4
porizonta	illo:	(2) x (46) N SIND (4) B + F (6) B = my (4) 4-1-1-1
7	15in 0 = My2 (2)	
	T	(4) -(3) F (SIN30+COS20) = MU (OS0 - MAGS):
(2) + (1)	tano = u2	
	rg	F = mu² (w6 _ mgSma _
	12 = rgtano	500
	= soogtane	
		vii) F = mv2 (asa mg Sinb
(()	= 500×9.8×0.1	·
	1.8 p	= m (2 v.) Costo - may Sinit (v=2v)
15 5	-11 6 tonia + Sina)	500
- (10Y >m	au & tan + Sine)	- 4mV, Cosa masing
	= 32673	- 4m V. Cose - mg Sinte-
	= 18 m/s.	but us = songtano
	·	F = 4m Spotant Gan -C'
<u>iv) </u>	Tec	F = 4m Soodano Goo mg Sino
,		= 4mg Sine - mg Sine
		= 3mg Sine

C	}		
= 3mg x 0.1	(b) i) 1 mg 1 R=mku2	- d/c 5 5 dv 9+kv2	(T-N)SIND =
= 3mg.x <u>l</u>	V=u_	-oc = 1 (g+ku2) +C	ii) no force on th
- 15mg.	i) ma = -ma-mkut a = -g-kut	2=0, 5=14	→ N=0 -: Ts,ne = m
F = 5 the Weight of the train	dvg-kv2	2=0, 5 = 11. 0 = 1k ln (g+ku2)+C . c = -1kln (g+ku2)	T Cos0 = 1
97 9 9 9 9 9 9 9 9 9 9	dt = -1 dv 9+Rv2	-21 = 21 Ln (9+185) - 27 ln (9+1	
Let nots be a, a, B, B.	K (- + v)	21 = 1/2 ln (g+ku2) - trln (g+bv2)	
2×+2β= -8	-kt dr = 1	= 12 ln (9+ku²) 9+kv²	<u>v² = rqt</u> , =0:5×q
2 × +13 = 16 (1)	- let = \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	greatest height v=0	= 2.04
(x+p)2+2~p=13=12	t=0, 5= u 0 = \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	x = 2tch (9+ku2)	0 = 1.43
54b() ista (2) 9 + 2x B = 13	c = - (+ tan / + u	- 1 km (1+ km²)	98) 4 = 22
αβ = 2	kt = \ \ \ \frac{h}{9} \tan \ \langle \ \ \frac{k}{3} \tan \ \langle \ \frac{k}{3} \tan \ \langle \ \ \frac{k}{3} \tan \ \langle \frac{k}{3} \tan \langle \frac{k}{3} \tan \ \langle \frac{k}{3} \tan \langle \frac{k}{3} \tangle \frac{k}{3} \tangle \frac{k}{3} \tan \langle \frac{k}{3} \tan \langle \frac{k}{3	c) tores at P	hy = h
Now 2x β + 2xβ = - a 2xβ (α+β) = 0		C TSING N-SING	1 dy = 1 × 3
12. = a.	max height vizo	T Gue P	구 영년 = 1-
also 2 = -b (&B) = -b	te The tantum	9 md	विद्यु = (1
22 = -b	$ii) ma = -mg - mkv^2$ $a = -g - kv^2$	(N.O. CP = OP = 1.3 . ACPO 1505CALLS	2 (
4 = -b -4 = b	Jan - g-ka2	. (cop = 40cp = 0)	b) arg (2+1)
. a = 12 b = -4	dv -9-kv2	Vertically TCOSO + NCOSO = mg	arg (2+i) - org
	dr -g-kv2	horizontally	at the angle from the
		TS100-NS00 = my2	the angle from

- du 5	(T-N)Sins = mu2 '
- dx 5 4 kv2	
L (- , b - 2) + (
- oc = 1/2k (g+kv2) +C	ii) on force on the Sphere
2=0, 5=1 0 = 1kln(g+kv2)+C - = -1kln(g+kv2)	ii) no force on the Sphere N=0 TSinB = mu (1)
0 = Ikln(g+kx)+C	1.5,n.8 = <u>Md</u> (1)
	T 6058 = mg -(2)
- 21 = 21 L/n (9+184-)- 21 L/n (9+1	<u></u>
	(1) + (2) tan B = u2
21 = Ikb (9+ku2) - tkb (9+bv2)	тд
2 21 (61)	U= ratano 13
= 12k ly (9+ku²) (9+ks²)	-0.5×08×0.5
	100
greatest height v=0	= 2.04 (1.2 Pha
——————————————————————————————————————	0 = 1.43 m/s
x = 2tch (9+ku2)	9 - 173 m/ 2
· · · · · · · · · · · · · · · · · · ·	2.
	(25) (y = 2c x+) (h y = (x+1) (ha (h y = alax + bax
	9) 3-50
	<u> </u>
c) forces at P	(3(+1) Chal
• •	hy = alhox + lnox
C TSING IT - JAN	+ dy - x + + ln x + - +
0 - 2	
C Time NSine N	1 dy = 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1
	•
0/4	# (1+ st + ln x) y
o mid	
	こ (1+かけかか) スキリ
(H.B. CP = OP = 1.3 . A CPO 1505COLUS	
1 < 0 = 40 cp = 0)	/2
	b) arg (2+1) = 0
Vertically	
TC050 + N COSO = mg	arg (z+i) = org (z=i) = 0
(T+N) CUB = mg.	org (2+4) = org (2-4)-
horizontally	of the angle from the positive OX
TSURE LIST A S MY	direction from -1 to 2 equals
TSM0-NSm0 = mv2	the engle from the positive
	1 And T. Washing the same of the same o

Alex of cross sent 100 1 1 1 1 1 1 1 1 1		
Collinear To lies between -land . V = \(\left(\frac{13-4}{12} \right) \) I then single insolute be opposite in sign. 2	direction from i to Z	Now 4=x3 and 4=x,
Collinear To lies between -land . V = \(\left(\frac{13-4}{12} \right) \) I then single insolute be opposite in sign. 2		
Now if Z lies between -land . N = \(\begin{array}{c} \frac{13^{-3}}{12} \\ \frac{1}{2} \\ \frac	Collinear.	·
1	Now if Z lies between - land	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
connect be between -1 and i Connect be between -1 and i $ \begin{array}{cccccccccccccccccccccccccccccccccc$	i then angle would be	to
$\frac{1}{2} \left[\frac{3}{2} - \frac{43}{12} + \frac{3}{3} \right]_{3}^{3}$ $= \frac{1}{66} \text{ cubic units}$ $\frac{1}{2} \left[\frac{3}{2} - \frac{43}{12} + \frac{3}{3} \right]_{3}^{3}$ $= \frac{1}{66} \text{ cubic units}$ $\frac{1}{2} \left[\frac{3}{2} - \frac{43}{12} + \frac{3}{3} \right]_{3}^{3}$ $= \frac{1}{66} \text{ cubic units}$ $\frac{1}{2} \left[\frac{3}{2} - \frac{43}{12} + \frac{3}{3} \right]_{3}^{3}$ $= \frac{1}{66} \text{ cubic units}$ $\frac{1}{2} \left[\frac{3}{2} - \frac{43}{12} + \frac{3}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{3}{2} - \frac{43}{12} + \frac{3}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{3}{2} - \frac{43}{12} + \frac{3}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} + \frac{3}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} + \frac{3}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} + \frac{1}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} + \frac{1}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} + \frac{1}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} + \frac{1}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} + \frac{1}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} + \frac{1}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} + \frac{1}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} + \frac{1}{3} \right]_{3}^{3}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} + 1$	opposite in sign 2	= - \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
$\frac{1}{2} \left[\frac{1}{2} - \frac{1}{12} \frac{1}{2} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{3} + \frac{1}{3} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{2} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{2} + \frac{1}{2} \frac{1}{2} + \frac{1}{3} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{2} + \frac{1}{2} \frac{1}{2} \right]_{0}^{1}$ $= \frac{1}{2} \left[\frac{1}{2} - \frac{1}{2} \frac{1}{2} + \frac{1}{2} $	Cannot be between -1 and i	/0 2
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		- 1 - 4 - 4 - 4 - 4 - 4 - 1
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		2 2 3 - 7 3 -
$= \frac{1}{66} \text{Cabic Units}$ $= \frac{1}{66} \text{Cabic Sins} \text{Cabic Sins} $		·
$\frac{1}{12} \frac{1}{12} \frac$	>>:c	- 2 2 5 3
$\frac{d}{d} = \frac{1}{2} $		
$= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{1})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{1})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{2})(\omega_{2})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{2})(\omega_{2})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2})(\omega_{$		- 60 CUDIC UNITS
$= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{1})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{1})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{2})(\omega_{2})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{2})(\omega_{2})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2})(\omega_{$		47
$= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{1})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{1})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{2})(\omega_{2})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{2})(\omega_{2})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2})(\omega_{$	-> 5. 45° V	() Cas[(n-1) 0 + 0] - (as[(n-1)0 - 0]=
$= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{1})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{1})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{2})(\omega_{2})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2}) + \sin(\omega_{1})(\omega_{2})(\omega_{2})(\omega_{2})(\omega_{2})$ $= (\omega_{1})(\omega_{1})(\omega_{2})(\omega_{$		-25m(n-)105in5
Area of cross-section = $-(\cos(n-1))\cos(n+1)\cos(n-1)\cos(n+1)$ $= AB^2$	C (21) (2 - 3 (21)	L.H.S.
Area of cross-section = $-(\cos(n-1))\cos(n+1)\cos(n-1)\cos(n+1)$ $= AB^2$		= Cos (n-1) Q(us 0 - Sin (n-1) O Sin 0
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		- (cos(n-1)0(u0+5)in(n-1)05in0)
Now from triangle ABC ii) AB = Sin 45. AB = BC Sin 45. $ \begin{array}{cccccccccccccccccccccccccccccccccc$	Area of cross-section	
AB = BC Sin 45 $ \frac{31-x_1}{\sqrt{2}} = \frac{31-x_1}{\sqrt$	= AB ²	5 R.H.S
AB = BC Sin 45 $ \frac{31-x_1}{\sqrt{2}} = \frac{31-x_1}{\sqrt$	Now from triangle ABC	it)
AB = BC Sin 45 $ \frac{31-x_1}{\sqrt{2}} = \frac{31-x_1}{\sqrt$	<u>AB</u> - Sm45	Un - Un - 2 - COSAO COSEC O COO
$\frac{\pi_{2}-\pi_{1}}{\sqrt{2}} = \int Coseco \left(cosno - (cos(n-2)s) d\theta \right)$ $= \int Cos$	00 - 8/ 5	- [(a)/n-2) A (max a da
$\frac{1}{2} \frac{1}{2} \frac{1}$		· ·
$\frac{1}{2} \frac{1}{2} \frac{1}$		= [Coseca Cosna - (cs (n-2)6 de
$\frac{1}{\sqrt{2}} = \frac{\left(\frac{3(2-3)}{\sqrt{2}}\right)^{2}}{\sqrt{2}} = \frac{1}{2} \int \frac{\sin((n-1)\theta) d\theta}{\sin((n-1)\theta) d\theta}$ $\frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \int \frac{3(2-3)}{\sqrt{2}} d\theta$ $\frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \int \frac{\sin((n-1)\theta) d\theta}{\sin((n-1)\theta)}$ $\frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \int \frac{\sin((n-1)\theta) d\theta}{\sin((n-1)\theta) d\theta}$		1 '
$\frac{1}{\sqrt{2}} = \frac{\left(\frac{3(2-3)}{\sqrt{2}}\right)^{2}}{\sqrt{2}} = \frac{1}{2} \int \frac{\sin((n-1)\theta) d\theta}{\sin((n-1)\theta) d\theta}$ $\frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \int \frac{3(2-3)}{\sqrt{2}} d\theta$ $\frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \int \frac{\sin((n-1)\theta) d\theta}{\sin((n-1)\theta)}$ $\frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \int \frac{\sin((n-1)\theta) d\theta}{\sin((n-1)\theta) d\theta}$: Volume of Slice	- Cosaco (-25in(n-1)05ino do froma
$\frac{\sqrt{3} \log_{n}}{\sqrt{2}} \stackrel{?}{=} \frac{\sum_{n} \left(\frac{2N_{n}-2N_{1}}{\sqrt{2}}\right)^{2} \Delta y}{\sqrt{2}} \stackrel{?}{=} \frac{2}{\sqrt{2}} \frac{2 \log_{n}(n-1)\theta}{\sqrt{2}}$ $\frac{\sqrt{2} \log_{n}(n-1)\theta}{\sqrt{2}} \frac{2 \log_{n}(n-1)\theta}{\sqrt{2}} \stackrel{?}{=} \frac{2 \log_{n}(n-1)\theta}{\sqrt{2}}$	= ()(1-x,)2.	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	\(\sigma_{2}\)	=-2/ Sin (n-1)0 d0
$\frac{\sqrt{-1/m}}{\sqrt{2}} \leq \frac{\sqrt{2-21}}{\sqrt{2}} \Delta y - \frac{2 \cos(n-1)\theta}{\sqrt{2}}$	Valume = ∑ (\frac{\times - \times \(\frac{\times - \times _1}{\times - \times _1} \) \times \(\frac{\times - \times _1}{\times - \times _1} \) \times \(\frac{\times - \times _1}{\times - \times _1} \)	
$\frac{1}{2} = \frac{2 \cos(n-1)\theta}{2}$. J= 0	$\frac{1}{2}$ $\frac{1}$
- 2 cos (n-1) d	$V = \lim_{N \to \infty} \frac{1}{N} \left(\frac{N^{2}}{\sqrt{2}} \right) \Delta y$	<u>n-1</u>
$\Lambda = \sqrt{\left(\frac{\sqrt{3}}{5(r-x_1)}\right)_3} \eta^{\frac{1}{2}}$	71 2 7=9	· 1 · · · · · · · · · · · · · · · · · ·
10 (Na) 124		Pi-1
	10 (1/2)	

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12	· · · · · · · · · · · · · · · · · · ·
	•
The second secon	
<u>[(i)</u> 1/2	
517 0 SIN 0	
Jo 517 8	
10 517 8	
,	
Now Un-Un-2 = 2 (m-1) 0	
n-1	
1) = 2 (ps(n-1)0 + U	
$\frac{1}{N_n} = \frac{2(\cos(n-1)\theta)}{n-1} + \frac{1}{N_n} = \frac{2}{2}.$	
· Vg = 260570 +VG	
7	
U6 = 2 Cos 50 + V4	
5	
- U4 = 2 (013B + 1)2	
3	
: Uz = 2(0570 -2656 -26530 -1Uz	
	1
Uq U2 = 2 (0570 - 2 (050) 7 (0530) 1/2	
- (2(057 2 ,2(058 2 ,2(053 2)	
$-\left(\begin{array}{c} 2 \\ \hline 7 \end{array}\right) + \left(\begin{array}{c} 2 \\ \hline 5 \end{array}\right)$	
= 0 - 142 105	
. /65	
111-2	
U2-U4 = 142	