Question 1 (12 marks)

Marks

a) Differentiate the following;

i.
$$e^{-3x}$$
 (1)

ii.
$$e^{\sin x}$$
 (1)

iii.
$$\log_e (4x+1)^2$$
 (2)

iv.
$$\frac{\log_e x}{x}$$
 (2)

b) Find the following;

i)
$$\int e^{-2x} dx$$
 (1)

ii)
$$\int_{1}^{6} \frac{6}{2x+3} dx$$
 (2)

c) Find the equation of the normal to the curve $y = e^{x^2}$ at (1, e). (3)

Question 2 (12 marks) (START A NEW PAGE)

a) Draw a sketch of
$$y = 3\cos 2x$$
 over $0 \le x \le 2\pi$ (2)

b) Differentiate the following;

i.
$$y = \tan^2 4x$$
 (2)

ii.
$$y = 2\sin x^2$$
 (2)

iii.
$$y = e^{2x} \cos 3x \tag{2}$$

- c) Find the area between the two curves $y = \cos x$ and $y = \sin x$ over the domain (2) $0 \le x \le \frac{\pi}{4}$.
- d) Find the volume of the solid formed by $y = \sec x$ being rotated about the x axis (2) between x = 0 and $x = \frac{\pi}{4}$.

Question 3 ... page 2

Question 3 (11 marks) (START A NEW PAGE)

- a) A piece of plyboard has many slits cut into it. Each pair of slits has a constant difference in length. The shortest slit is 30cm and the longest slit is 50cm.
 - i. If the total length of all the slits is 1240cm, find the number of slits. (2)
 - ii. Find the constant difference in length between the slits. (2)
 - iii. Find the length of the 11th shortest slit. (1)
- b) In a geometric sequence of numbers the third term is 72 and the eighth term is 17496.
 - i. Find the first term and the common ratio. (2)
 - ii. Which is the largest term of the sequence less than 500000? (2)
 - iii. What is the sum of the terms less than 500000? (2)

Question 4 (10 marks) (START A NEW PAGE)

- a) Frank and Eddie shared a Lotto win. Their shares are \$10000 each.
 - i. Frank invested his \$10000 in an investment account on January 1st (2) 2000. It is invested at 9% per annum, compounded monthly.

 How much would be in the investment account on January 1st 2010, if no other payments were made during this period?
 - ii. Eddie invested his \$10000 in an investment account on the same day
 as Frank. The interest on his investment account was compounded
 annually, at 9% per annum. He decided to deposit an extra \$1000 on
 January 1st, each year from January 1st 2001 to 1st January 2010.
 How much would be in his account on January 1st 2010, including the last
 deposit.
- b) Jan borrows \$8000 and agrees to repay it in equal instalments each year (4) for 10 years. If the interest is charged at 7% per annum on any part of unpaid debt, calculate the amount of each yearly instalment.
 - i. Let $\$A_n$ be the amount owed on the loan after n years and let M be the instalments.

Show that
$$A_n = 8000(1.07)^n - M\left(\frac{1.07^n - 1}{1.07 - 1}\right)$$

ii. Hence, calculate the amount of each yearly instalment.

END OF TEST

Yn 12 Martis 2011 (12 marks) Question (a)(i) $d = -3x = -3e^{-3x} \vee (1)$ (II) de esinx = cosxe sino (1) $(111) \frac{d}{dx} \log_{e} (4x+1)^{2} = d2 \log_{e} (4x+1)$ = 2 × 4 V (b) (i) $(e^{-2\zeta}) d\alpha = -e^{-2\zeta} + C V (i)$ (do not deduct marks for missing (ii) $\int_{1}^{6} \frac{b}{2x+3} dx = \int_{1}^{6} 3x \frac{2}{2x+3} dx$ $= \left[3 \times \log_{e}(2x+3) \right]^{6} V$ = 3 (log 15 - log 5) = 3 log 5 (2) = 10927 (c) $y = e^{x^2}$ $\frac{dy}{dx} = 2xe^{x^2}$ gradient of tangent at (1,e) : m = 2e gradient of normal $M = -\frac{1}{20}$

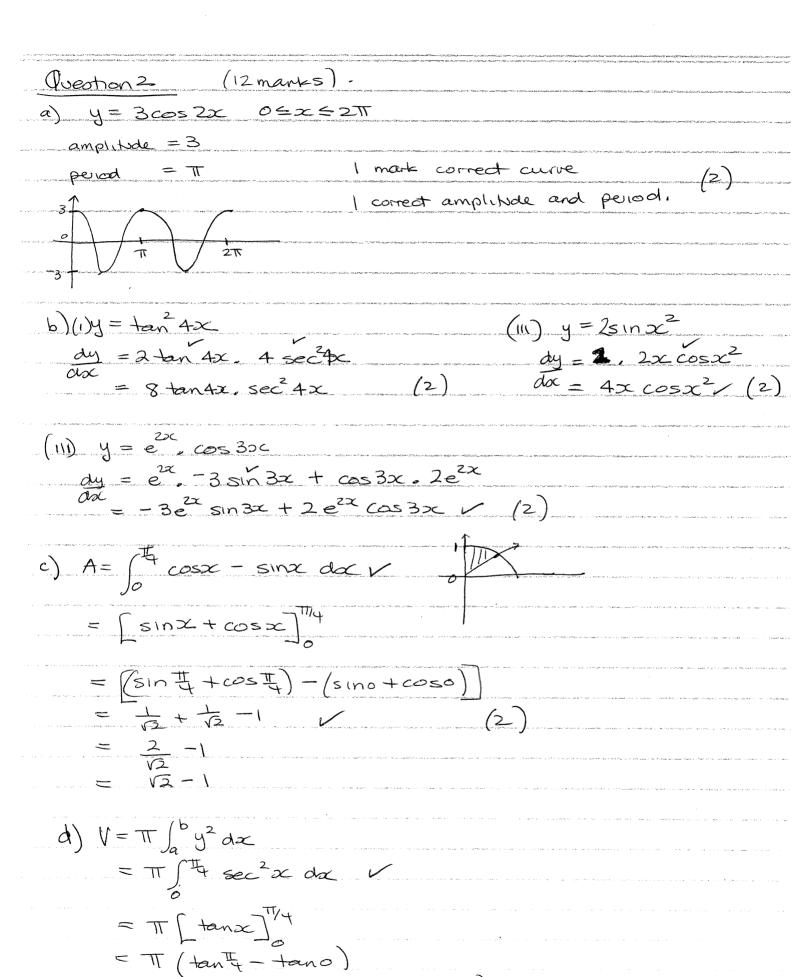
(3)

 $1/2 \times 12 = 0$

egestion of normal

2ey-2e2 = -xt1

y-e=-1=(x-1)



TAB M2

Question 3

A)
$$a = 30 \text{cm}$$
 $A = 50 \text{cm}$

(i) $S_A = 12.40 \text{cm}$
 $S_A = \frac{9}{4}(a + b)$
 $1240 = \frac{9}{3}(a + 50)$
 $1240 = \frac{9}{3}(a + 50)$
 $1240 = 0 \times 40$
 $1240 = 0 \times$

the largest 1055 thom 500 000

Question 3	i gira, i en esta frajantesi i (en lassessassa del tras tras al sensisti del el del come del disputa del consi Natura del consiste del consistente del consist	la uluusu, mena efektis kili serikkonin Silene to Kili efektivanjina kan i, kausikula de kel Kilinga umit uluusikansi menansi manansi di disembar undan pasik pasik Barin di dalam et kel
$b)(m) Sn = a(r^n - 1)$	NGO 电时间分配性 在上线上 (1777) Janger Call Profession (1779) Profession (1774) Profession (ingiga, ng tignalish ilibili majigi dan wan na najiga ka makanan 1 Albana.
= 8 (3" -1) V	LL TOMORDES (MYST) THE STATE OF MANY SEVEN S	CATES CANADA MACANIMA CALLACEMENTA CALLACEMENTO MACANIMA CALLACEMENTO CALLACEMENTO CALLACEMENTO CALLACEMENTO CA
	A, TANGALARI ATI MININGGANA CANATATI ANA MILIMANI ANA MILIMANI ANA MILIMANI ANA MILIMANI ANA MININGGANA ANA MI	
=708587 V(2)		
i te sund tems 708 587	Littlewaterwessissiphoneum ergann, marwydd gwleighn west af fall gegyn west wys yn diwysd yn gwlei y gwlei y d Y fall y gwlei	الله المراحة
		makanar (semingkal) digina 1888 kati Magawa mansar singka mangga mangga mangga mangka ka ka ka mad niga balkan
	ngggy was a tippy water o nichtige. 1/1 etc weißt honder op 1 danbakkern erworden den der stelle	ennekkrijská nilosof kammonori szahkoroslándeki kölnüléndőléldélt.
	and the second s	anemalateen en
	BELLEGISCHE JEGEN EINE TERMEN WERTE VERWEN EIN BESTELLE STEINE VON BESTELLE STEINE VERSCHEIN BESTELLE VERSCHEI Bellegische Jegen bestellt ver der der der der der der der der der d	
	ارسان معدوط دوار الإنجاع والآن و روسان معدول دوار إن استراق المناق والمناق والمناق والمناق والمناق والمناق وال	Mark 1888 STANSSONS T KÄRATEST, TONOR STANST THE MERCHAL STANS STANS STANS STANS STANS STANS STANS STANS STANS
	ernaan viigava kuulkuululu (seks vain eli elikuu elik 1 (liik 1 (vain vain kalkuu elik 1 (liik 1 (liik 1 (liik	المنابع معطوب المطاوليون إذ المقام الآي العدمة والوجع إلياناً " إليان مجال العدم" (((العالم العدم العربية الم العالم العالم
	184 - 1844 - 1885 - 1885 - 1885 - 1885 - 1885 - 1885 - 1885 - 1885 - 1885 - 1885 - 1885 - 1885 - 1885 - 1885 -	res again sersence notes sommantismonialistis deringitimositis sommander services
		makaka ka 1888 ya marini watanina kata ka ka maka ka marini ka maka 1986, mwaka maka 1986, mwaka 1986, mwaka 1
	والإركاب المساورة والمساورة والمساور	laur Paul, N. Sydnighte + 1 and The Engris Japanis (1944). Design (1948).
		9 JB 1885,000,000,000,000 04 58 93 496,00 05 05 55 6 16 16 16 16 16 16 16 16 16 16 16 16 1
	والمستعمد والمستعمد المستعمد المستعمد المستعمد والمستعمد والمستعمد والمستعمد والمستعمد والمستعمد والمستعمد	Birdagganiscandda) - yw rhyw o Briganiga (1935 wybri regeneriyad i'm cagolinaad
	erintalah di kindilah antak i selembekan padalah pidangan mandi selembi selembi selembi selembi selembi selemb	urry 1887 sprikkeur han frank ur den er der ein de Nord-Franklik 1885 i d'e nêrtst saar 1988 bekende
	errorror cal whose is the first of the statistical state of the state	رين و موجود و موجود المستقدة ا
	iggger-brigger	papag papan nggagaban sa berenda samin dibalin sa iku kima andishindi dibalin dami
		igan etdakrissis, omerskeler, fa formar folklepapis, for dette fillstakke en hallet kriterije.
	an umpleknist inhalasis svenski ettiminettitik siikkaivaattiin siikkaivaattijitettiin siikkaivattiinetti	dermen, magallungara, sin milijiji ammanya silamin in E. S. Zharka meneri ndalaka Emeli
	والمستعدد والمستعد والمستعدد والمستع	وكالمساء المحاجب والمثالية على الميكاني ويون وجود والمداور المداور والمداور والمداور المحاجبة المناط والمساورة
The state of the s	er spinnegering værerets. Verminisk havet gegentrikkt eggin ett til met att dett komfet er i kolonisk	dament en president de en disse en
A. A. A. SAND HER PROPERTY OF THE PROPERTY OF	anna ann an Aireann an Aireann ann an Aireann ann an Aireann an Aireann an Aireann an Aireann an Aireann an Ai	ng pangundagan pangundagan da anaka at mana at mana anakan sa mana at mana
The second secon	enan demonstra de la calenta cama de de esta e canta de entre de entre en entre en entre en entre en entre en	kaping a mengapangkan pangkan mengahan penghangan penghangan penghangan penghangan penghangan penghangan penghan Penghangan penghangan penghangan penghangan penghangan penghangan penghangan penghangan penghangan penghangan
	en e	and a confidence of the state o
	والمرافقة والمرافقة والمنافقة والمرافقة والمرافقة والمنافقة والمنا	enterview (1975)
	re guerralportunis per 2. design membran printing () designet et dispetation () designet et designet	ggy menny grity processor i i i i jalah militang dipandang pelangan promins
	and the state of t	المعاومة فيبدو المراوضية المحادثة والمعادة المحادثة المحادثة المحادثة
2 FOR THE		ayaanay kaana kaana aana kaana ka

```
Queston4
(a)(1) P=$10000
    r%=90/op.a. =0.75% permonth=0-0075
    n = 10 years = 120 months
   A = 10000 (1.0075)120
      = $24513-57078
      = $24513-57 (n.c)
(11) P=$10000 + $1000 each year after.
   r% = 9%p.a =0.09
   n = 10 years
 2000 A, = 10000 (1.09)10
 2001 Az = 1000 (1.09)9
2002 A3 = 1000 (109)
2000 A10 = 1000 (109)
2000 An = 1000 (1.09)
 A TOTAL = 10000 (1.09) + 1000 (1.09) + 1000 (1.09) + ... + 1000 (1.09) + 1000
       = 10000 (1.09)10 + 1000 (1+ 1.09 + 1.092+ .... + 1.099)
       = 10000(1.09)10+1000 (1(1.09)10-1)
        = $38866.56646
        = $38866,57 (nc.)
Alternative Method
       A1 = 10000 (1.09)
 2000
       Az = (10000 (1.09)+1000) (1.09)
 200 L
          = 10000 (1.09)2+1000(1.09)
2002
       A3 = (10000(1.09)+1000(1.09)+1000)(1.09)
          = (10000(1.09)3+1000(1.09)2+1000(1.09)
      A 10 = 10000 (1.09) + 1000 (1.09) + ... +1000 (1.09)
2009
       AT = 10000 (1.09) + 1000 (1.09) + ... + 1000 (1.09) + 1000
2010
           = 10000 (1.09)10 + 1000 (1(1.09)10-1)
                                                      (3)
       AT = $38866,57 (nc)
```

(b) $P = \$8000$
r = 706 p.a. = 0.07 $n = 10$
m= yearly instalment.
$A_1 = 8000(1.07)' - m$
$A_2 = (8000(1.0)^2 - H)(1.07) - M$
= $8000(1.07)^2 - m(1.07) - m$
$A_3 = (8000(1.07)^2 - m(1.07) - m)(1.07)' - m$
= $8000(107)^3 - m(1.07)^2 - m(1.07)^2 - m$
$A_{10} = 8000(1.01)^{10} - m(1.07)^{9} - m(1.07)^{8} - m(1.07)^{2} - \dots m^{1}$
=8000(1.07)10-m(1+1.07+1.072++1.079).
= 8000 (1.07)10 - m (1(1.0710-1)
1.07-1
=8000(1.07)0-m(13.81644796)/
m = 8000 (110)10
13:81644796
m = \$1139.020022
M = \$1139.02 (nc)