10

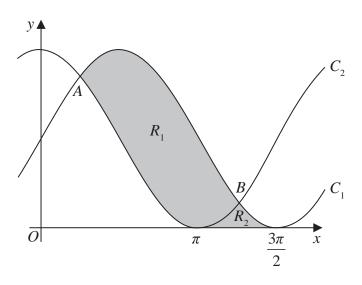


Diagram **NOT** accurately drawn

Figure 2

Figure 2 shows part of the curve  $C_1$  with equation  $y = \sin x + 1$  and part of the curve  $C_2$  with equation  $y = \cos x + 1$ 

As shown in Figure 2,  $C_1$  and  $C_2$  intersect at the point A and at the point B

(a) Find the exact value of the x coordinate of A and the exact value of the x coordinate of B

(3)

The shaded finite region  $R_1$  shown in Figure 2 is bounded by  $C_1$  and  $C_2$ 

The shaded finite region  $R_2$  shown in Figure 2 is bounded by the x-axis,  $C_1$  and  $C_2$ 

(b) Use calculus to find the ratio

area of  $R_1$ : area of  $R_2$ 

Give your answer in the form $a$ :	$\left(\frac{\pi\sqrt{2}}{b}-c\right)$	where $a$ , $b$ and $c$ are integers.
------------------------------------	--	---------------------------------------

**(9)** 






Question 10 contir	iueu		



DO NOT WRITE IN THIS AREA

$\sim$	
	XXXX
$\times$	$\times$
	$\sim\sim$
X	
X	
$\sim$	
$\times$	
$\sim$	
X	$\times \times \times \times$
$\sim$	
$\times$	
×	$\odot$ $\times$
$\propto$	
$\times$	XXX
$\times$	$\cong$
X	$\times$
$\propto$	$\mathbb{R}^{\times}$
$\times \rangle$	$\times \times $
$\times$	XXXX
X	$X = X \times X$
$\propto$	XX (X)
$\times$	
×	
$\sim$	$=$ $\times$
$\times$	$\Join$
$\sim$	
X	m
^/	
$\times$	$\times \times \times \times$
	X
×	
X	XXXX
$\times \rangle$	
X	$\infty$
×	$\sim \sim$
	$\times \times \times \times$
42	
X)	
×	
X	
	$\times$
×	
	$\cdots$
$\langle \rangle$	
$\times$	
×	
$\times$	X U (X)
$\langle \rangle$	
X	
X	/II,II,IK/XX
	<b>&gt;&gt;&gt;&gt;</b>
X	
X	
×	$\times\!\times\!\times\!\times$
$\sim$	$\times\!\!\times\!\!\times\!\!\times$
	$\times\!\!\times\!\!\times\!\!\times$
	$\sim\sim\sim$
X	$\times \times \times \times$
$\propto$	$\times\!\!\times\!\!\times\!\!\times$
X	$\times \times \times \times$
$\times$	$\sim\sim\sim$
	$\times \times \times \times$
$\sim$	$\sim\sim$
	$\times \times \times \times \times$
	$\triangle \triangle \triangle \triangle$
X	$\times\!\!\times\!\!\times\!\!\times$
	$\times\!\!\times\!\!\times\!\!\times$
X	
	$\times\!\!\times\!\!\times\!\!\times$
	$\times\!\!\times\!\!\times$
*	
	D
	D
	D(
	DO
	DO
	DO
	DOA
	DO N
	DO N
	DONO
	DONO
	DO NO:
	DONOT
	DO NOT
	DONOT
	DONOTY
	DONOTW
	WTONO
	WTONO
	O NOT WE
	O NOT W
	O NOT WE
	O NOT WE
	O NOT WE
	O NOT WRITE
	O NOT WE
	O NOT WRITE
	O NOT WRITE I
	O NOT WRITE
	O NOT WRITE I
	O NOT WRITE IN TH
	O NOT WRITE IN THI
	O NOT WRITE IN THI
	O NOT WRITE IN TH
	O NOT WRITE IN THI
	O NOT WRITE IN THI
	O NOT WRITE IN THIS A
	O NOT WRITE IN THIS A
	O NOT WRITE IN THIS A
	O NOT WRITE IN THIS A
	O NOT WRITE IN THI
	O NOT WRITE IN THIS A
	O NOT WRITE IN THIS ARE
	O NOT WRITE IN THIS ARE
	O NOT WRITE IN THIS A

Question 10 continued	



11

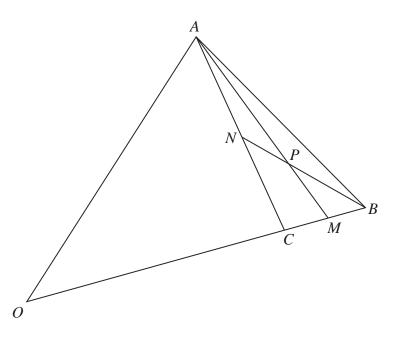


Diagram **NOT** accurately drawn

Figure 3

Figure 3 shows triangle OAB with  $\overrightarrow{OA} = \mathbf{a}$  and  $\overrightarrow{OB} = \mathbf{b}$ 

The point C lies on OB such that OC: CB = 2:1

The point M is the midpoint of CB and the point N is the midpoint of AC

The lines AM and NB intersect at the point P

(a) Using a vector method, find  $\overrightarrow{OP}$  as a simplified expression in terms of **a** and **b** 

**(9)** 

The point Q is the midpoint of AB

(b) Using a vector method, show that C, P and Q are collinear.

(4)

| <br> |
|------|------|------|------|------|------|------|------|------|------|
|      |      |      |      |      |      |      |      |      |      |
| <br> |
|      |      |      |      |      |      |      |      |      |      |
| <br> |
|      |      |      |      |      |      |      |      |      |      |
| <br> |
|      |      |      |      |      |      |      |      |      |      |
| <br> |
|      |      |      |      |      |      |      |      |      |      |

	Question 11 continued
SAREA	
EINTHE	
NOT WRITE IN	
DON	
EA	
THIS AREA	
WRITEIN	
V TON O	
AREA	
EIN THIS	
O NOT WRITE IN THIS AREA	
DO NC	



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

nestion 11 continued	
	(Total for Question 11 is 13 marks)  TOTAL FOR PAPER IS 100 MARKS

