

MATHEMATICS
STANDARD LEVEL
PAPER 1

Thursday 2 November 2006 (afternoon)

1 hour 30 minutes

Candidate session number

0	0							
---	---	--	--	--	--	--	--	--

INSTRUCTIONS TO CANDIDATES

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all the questions in the spaces provided.
- Unless otherwise stated in the question, all numerical answers must be given exactly or correct to three significant figures.



2. Let $\ln a = p$, $\ln b = q$. Write the following expressions in terms of p and q .

(a) $\ln a^3b$

(b) $\ln\left(\frac{\sqrt{a}}{b}\right)$

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



3. The box and whisker diagram shown below represents the marks received by 32 students.



- (a) Write down the value of the median mark.
- (b) Write down the value of the upper quartile.
- (c) Estimate the number of students who received a mark greater than 6.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

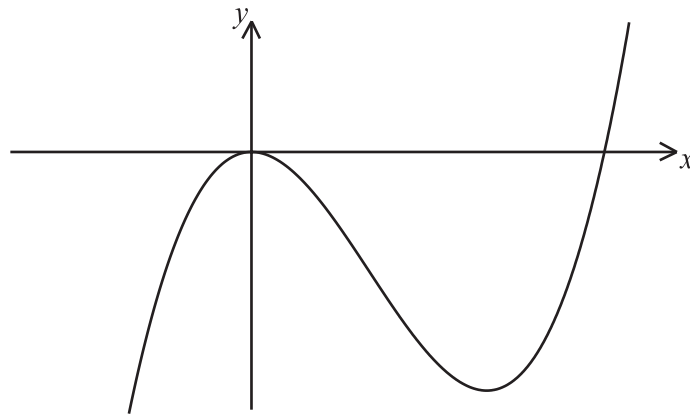
.....

.....

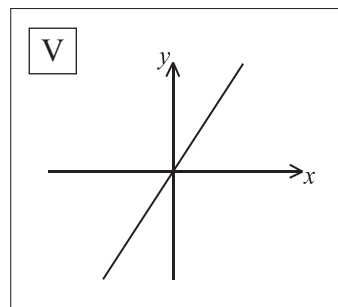
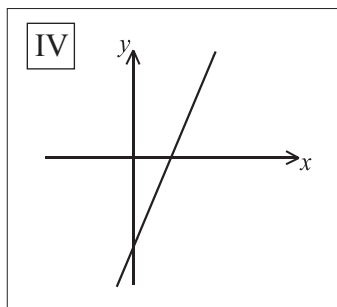
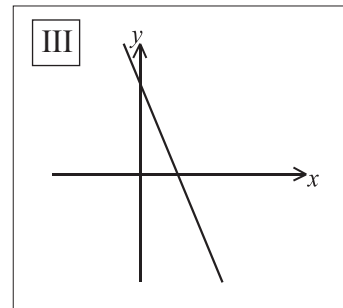
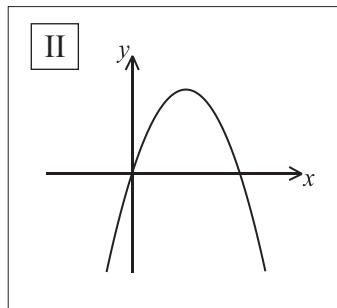
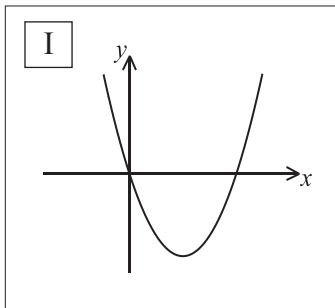
.....



4. The following diagram shows the graph of a function f .



Consider the following diagrams.



Complete the table below, noting which one of the diagrams above represents the graph of

(a) $f'(x)$;

(b) $f''(x)$.

	Graph	Diagram
(a)	$f'(x)$	
(b)	$f''(x)$	



5. Events E and F are independent, with $P(E) = \frac{2}{3}$ and $P(E \cap F) = \frac{1}{3}$. Calculate

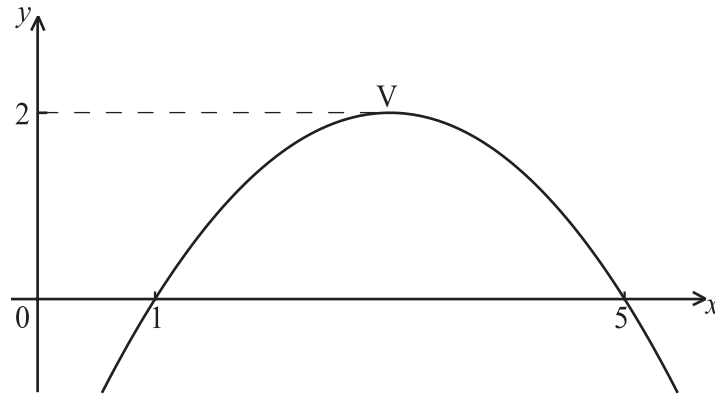
(a) $P(F)$;

(b) $P(E \cup F)$.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....



6. Part of the graph of the function $y = d(x - m)^2 + p$ is given in the diagram below. The x -intercepts are $(1, 0)$ and $(5, 0)$. The vertex is $V(m, 2)$.



- (a) Write down the value of
- (i) m ;
 - (ii) p .
- (b) Find d .

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



8. Find the **exact** value of x in each of the following equations.

(a) $5^{x+1} = 625$

(b) $\log_a(3x+5) = 2$

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



10. The velocity v in m s^{-1} of a moving body at time t seconds is given by $v = e^{2t-1}$.
When $t = 0.5$ the displacement of the body is 10 m. Find the displacement when $t = 1$.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....



11. The line L passes through $A(0, 3)$ and $B(1, 0)$. The origin is at O . The point $R(x, 3-3x)$ is on L , and (OR) is perpendicular to L .

(a) Write down the vectors \vec{AB} and \vec{OR} .

(b) Use the scalar product to find the coordinates of R .

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



12. A fair coin is tossed five times. Calculate the probability of obtaining

(a) exactly three heads;

(b) at least one head.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



13. The function f is defined by $f : x \mapsto 30 \sin 3x \cos 3x, 0 \leq x \leq \frac{\pi}{3}$.

(a) Write down an expression for $f(x)$ in the form $a \sin 6x$, where a is an integer.

(b) Solve $f(x) = 0$, giving your answers in terms of π .

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



14. The heights of certain flowers follow a normal distribution. It is known that 20 % of these flowers have a height less than 3 cm and 10 % have a height greater than 8 cm.

Find the value of the mean μ and the standard deviation σ .

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



