NAME :

SOUTH SYDNEY HIGH SCHOOL

Year 11 Assessment
June 2000

MATHEMATICS EXTENSION 1

Instructions :

Time Allowed: 1 Period

1. All questions may be attempted.
2. All necessary working should be shown.
3. Marks may be deducted for poorly arranged or missing working.
4. Approved calculators may be used.
5. Questions are **not** of equal value.

Question 1 (12 marks) **Marks**

(a) Find, without the use of the calculator, the exact value of : **4**

(i) $2\sin 30^0\cos 30^0$

(ii) $\text{cosec}^2 60^0 - \sec^2 60^0$

(b) Find the exact value of : **4**

(i) $\sin 585^0$

(ii) $\sec(-210^0)$

(c) Prove that : **4**

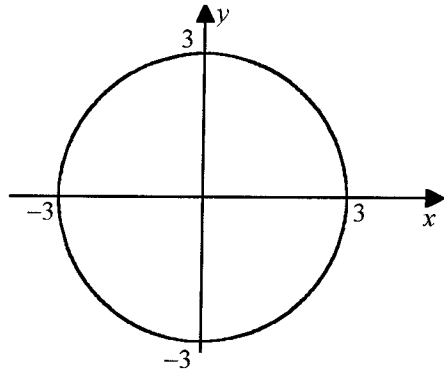
(i) $(1+\cos\theta-\sin\theta)^2 = 2(1+\cos\theta)(1-\sin\theta)$

(ii) $\dfrac{1}{1+\sin^2\theta} + \dfrac{1}{1+\text{cosec}^2\theta} = 1$

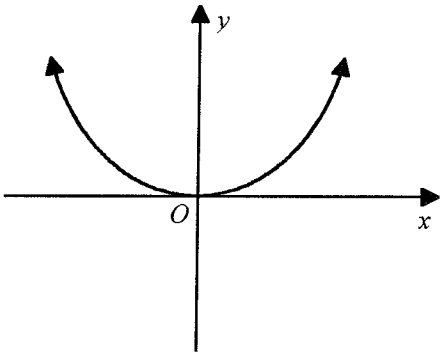
Question 2 (16 marks)

(a) State the **domain** and **range** of the following graphs and state if each is a **function** or **relation**. **12**

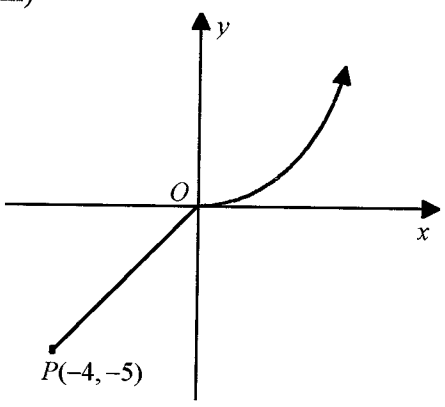
(i)



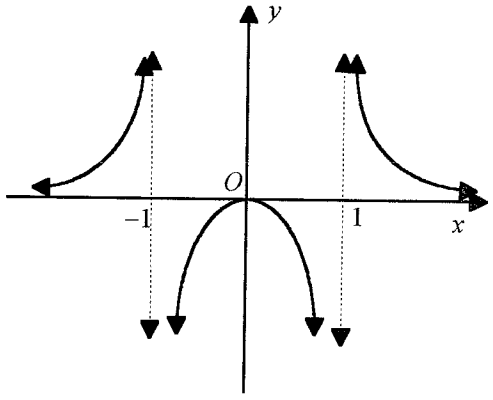
(ii)



(iii)



(iv)



(b) Given that $P(x) = 3x^2 + 11x$, find **4**

(i) $P(2) - P(-1)$

(ii) x when $P(x) = 4$

Question 3 (11 marks)

(a) Given that : **5**

$$f(x) = \begin{cases} 2 & \text{for } x < 0 \\ \sqrt{4 - x^2} & \text{for } 0 \le x \le 2 \\ 2 - x & \text{for } x > 2 \end{cases}$$

(i) Find : (α) $f(-3)$ (β) $f(1)$ (γ) $f(2 + a^2)$

(ii) Sketch the above composite function, $f(x)$.

(b) Sketch the region represented by : **6**

(i) $y > |x| \cap y \le 4 - x^2$

(ii) $x \ge -3$ and $y > 2^x$ and $x + 4y \le 4$

End of Paper

ANSWERS ONLY

(1) (a) (i) $\frac{\sqrt{3}}{2}$ (ii) $-2\frac{2}{3}$

(b) (i) $-\frac{\sqrt{2}}{2}$ (ii) $-\frac{2\sqrt{3}}{3}$

(c) (i) L.H.S. $= [(1+\cos\theta)-\sin\theta]^2$

$= (1+\cos\theta)^2 - 2(1+\cos\theta)\sin\theta + \sin^2\theta$

$= 1+2\cos\theta+\cos^2\theta-2\sin\theta-2\sin\theta\cos\theta+\sin^2\theta$

$= 2[1+\cos\theta-\sin\theta-\sin\theta\cos\theta]$

$= 2[1(1+\cos\theta)-\sin\theta(1+\cos\theta)]$

$= 2(1+\cos\theta)(1-\sin\theta)$ =R.H.S

(ii) L.H.S. $= \dfrac{1}{1+\sin^2\theta} + \dfrac{1}{1+\dfrac{1}{\sin^2\theta}}$

$= \dfrac{1}{1+\sin^2\theta} + \dfrac{1}{\dfrac{\sin^2\theta+1}{\sin^2\theta}}$

$= \dfrac{1}{1+\sin^2\theta} + \dfrac{\sin^2\theta}{1+\sin^2\theta}$

$= \dfrac{1+\sin^2\theta}{1+\sin^2\theta} = 1$ =R.H.S.

(2)(a) (i) $D: -3 \le x \le 3$
$R: -3 \le y \le 3$
Function

(ii) D :All real x
$R: y \ge 0$
Function

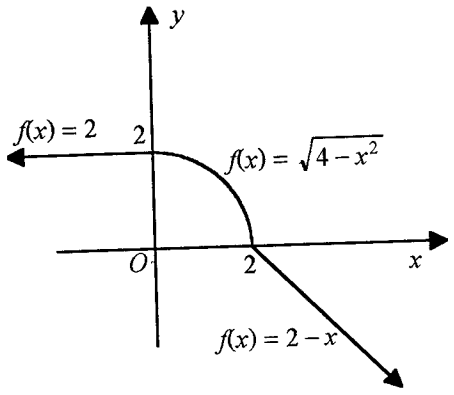
(iii) $D: x \ge -4$
$R: y \ge -5$
Function

(iv) $D: x \ne \pm 1$
R :All real y
Function

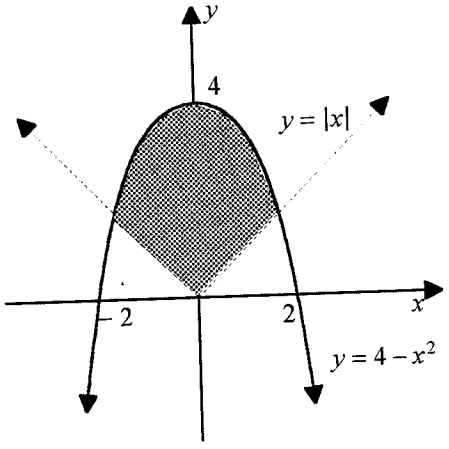
(b) (i) ~~48~~ 42 (ii) $\frac{1}{3}$ or -4

(3) (a) (i) 2 (ii) $\sqrt{3}$ (iii) $-a^2$

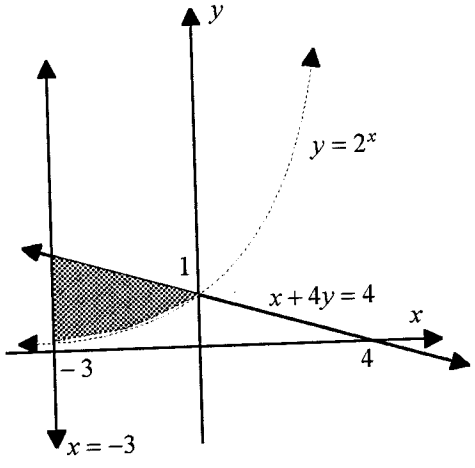
(ii)



(b) (i)



(ii)



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