2007 Cuna Ext 1 Half Yrly

Question 1

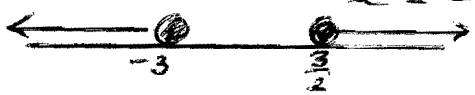
a) $|2x+1| \geq 4$

$2x+1 \geq 4$ or $-(2x+1) \geq 4$

$2x \geq 3$ $\quad -2x-2 \geq 4$

$x \geq \frac{3}{2}$ $\quad -2x \geq 6$

$x \leq -3$



$x \leq -3$ or $x \geq \frac{3}{2}$

b) $2m^3 - 128 = 2(m^3 - 64)$

$= 2(m-4)(m^2+4m+16)$

c) $\frac{1}{x^2-4} - \frac{1}{x^2+3x+2} = \frac{1}{(x+2)(x-2)} - \frac{1}{(x+2)(x+1)}$

$= \frac{(x+1)-(x-2)}{(x+2)(x-2)(x+1)}$

$= \frac{3}{(x+2)(x-2)(x+1)}$

d) $\frac{5}{x+2} \leq 1$

$x+2 \neq 0$

$x \neq -2$

$\frac{5}{x+2} = 1$

$5 = x+2$

$x = 3$

$x < -2$ or $x \geq 3$

e) $\frac{2x+1}{3x-2} > 2$

$3x-2 \neq 0$

$x \neq \frac{2}{3}$

$\frac{2x+1}{3x-2} = 2$

$2x+1 = 6x-4$

$4x = 5$

$x = \frac{5}{4}$

$\frac{2}{3} < x < \frac{5}{4}$

Question 2

a) $\tan A \sin A + \cos A = \frac{\sin A}{\cos A} \cdot \sin A + \cos A$

$= \frac{\sin^2 A + \cos^2 A}{\cos A}$

$= \frac{1}{\cos A}$

$= \sec A$

b) (i) $\cos 2\theta = -\frac{\sqrt{3}}{2}$

Q1, 4

$\cos \alpha = \frac{\sqrt{3}}{2}$

$\alpha = 30°$

$2\theta = 30°, 330°, 390°, 690°$

$\theta = 15°, 165°, 195°, 345°$

(ii) $\tan\theta + 2\cot\theta = 3$

$\frac{\sin\theta}{\cos\theta} + \frac{2\cos\theta}{\sin\theta} = 3$

$\sin^2\theta + 2\cos^2\theta = 3\sin\theta\cos\theta$

$\sin^2\theta - 3\sin\theta\cos\theta + 2\cos^2\theta = 0$

$(\sin\theta - \cos\theta)(\sin\theta - 2\cos\theta) = 0$

$\tan\theta = 1$ or $\tan\theta = 2$

Q1, 3 Q1, 3

$\tan\alpha = 1$ $\tan\alpha = 2$

$\alpha = 45°$ $\alpha = 63°26'$

$\theta = 45°, 225°$ $\theta = 63°26', 143°26'$

$\theta = 45°, 63°26', 143°26', 225°$

(iii) $\sec^2 x + \tan x - 7 = 0$

$\tan^2 x + 1 + \tan x - 7 = 0$

$\tan^2 x + \tan x - 6 = 0$

$(\tan x + 3)(\tan x - 2) = 0$

$\tan x = -3$ or $\tan x = 2$

Q2, 4 $x = 63°26', 143°26'$

$\tan\alpha = 3$

$\alpha = 71°34'$

$x = 108°26', 288°34'$

$x = 63°26', 108°26', 143°26', 288°34'$

(iv) $2\cos^2\theta = \cos\theta$

$2\cos^2\theta - \cos\theta = 0$

$\cos\theta(2\cos\theta - 1) = 0$

$\cos\theta = 0$ or $\cos\theta = \frac{1}{2}$

$\theta = 90°, 270°$

Q1, 4

$\cos\alpha = \frac{1}{2}$

$\alpha = 60°$

$\theta = 60°, 300°$

$\underline{\theta = 60°, 90°, 270°, 300°}$

c) $(1 + \cot^2\theta)(1 - \cos^2\theta)$

$= \operatorname{cosec}^2\theta \times \sin^2\theta$

$= \frac{1}{\sin^2\theta} \times \sin^2\theta$

$= 1$