Test

Name: Maanya
Start : 8:05
End : 8:52

25/29

Q1)

a) $D\hat{J}L = 90 - 34 = 56^\circ$

$56^\circ + 25^\circ = 81^\circ$ A1

$180^\circ - 81^\circ = 99^\circ = \hat{JDL}$ A1

b)

$\frac{\sin 99}{500} = \frac{\sin 56}{DL}$ M1A1

$DL = 419.6858151$

$DL \approx 420km$ A1

5/5

Q2)

a) cosine rule

(i) $AC^2 = 2^2 + 4^2 - 2(2)(4)\cos\alpha$

$AC^2 = 4 + 16 - 16\cos\alpha$ M1

$AC = \sqrt{20 - 16\cos\alpha}$ A1

(ii)

$AC^2 = 8^2 + 6^2 - 2(6)(6)\cos\beta$

$AC^2 = 64 + 36 - 96\cos\beta$

$AC = \sqrt{100 - 96\cos\beta}$ A1

(iii)

$\sqrt{20 - 16\cos\alpha} = \sqrt{100 - 96\cos\beta}$

$20 - 16\cos\alpha = 100 - 96\cos\beta$

$-16\cos\alpha = 80 - 96\cos\beta$

$\cos\alpha = -5 + 6\cos\beta$

$\alpha = \cos^{-1}(-5 + 6\cos\beta)$ A1

4/4

b) N/A

Q3)

a) $(f \circ g)(x) = \sqrt{3}\sin 2x + \cos 2x$ A1A1

b) $\sqrt{3}\sin 2x + \cos 2x = 2\cos 2x$

$\sqrt{3}\sin 2x = \cos 2x$

$\frac{\sqrt{3}\sin 2x}{\cos 2x} = 1$

$\sqrt{3}\tan 2x = 1$ M1

$\tan 2x = \frac{1}{\sqrt{3}}$ A1

$x = \frac{\pi}{12}$ A1 $\quad 0 \le x \le \pi$

5/7

Q4)

$\sin 2x - \cos 2x = 1 + \sin x - \cos x$

$2\sin x\cos x - \sin x - (2\cos^2 x - 1 - \cos x) = 1$ M1A1

$2\sin x\cos x - \sin x - (2\cos^2 x - \cos x) = 0$

$\sin x(2\cos x - 1) - \cos x(2\cos x - 1) = 0$

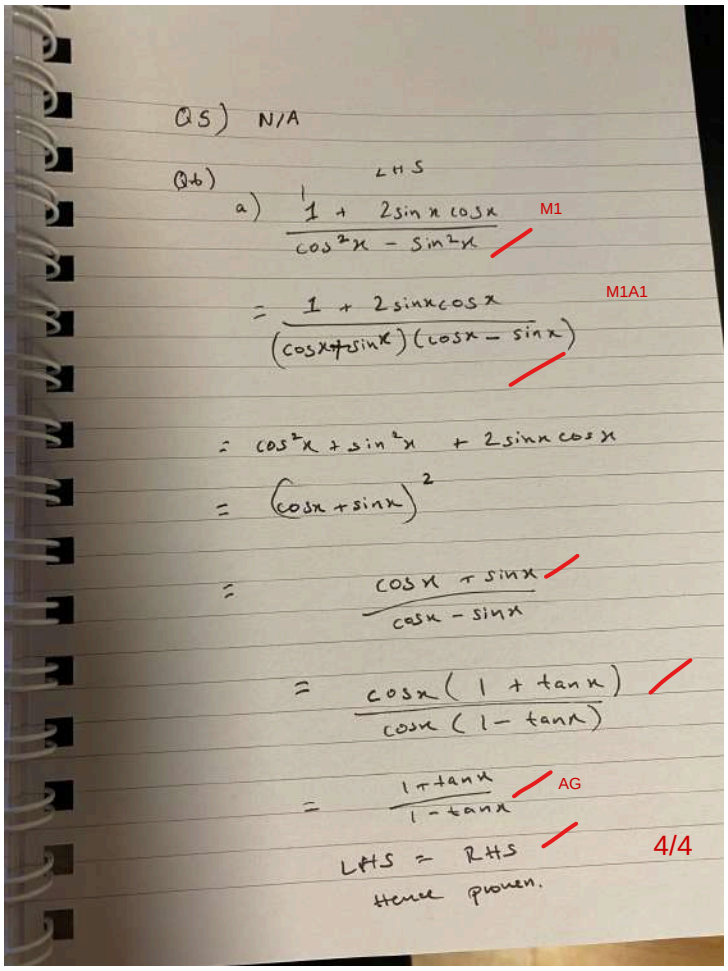
$(\sin x - \cos x)(2\cos x - 1) = 0$ M1

$\sin x = \cos x$ $\quad \cos x = \frac{1}{2}$ A1

$\tan x = 1$ A1

$x = -\frac{3\pi}{4}, \frac{\pi}{4}, -\frac{\pi}{3}, \frac{\pi}{3}$ A2

7/7



Q5) N/A

Q6)

a) LHS

$$\frac{1 + 2\sin x \cos x}{\cos^2 x - \sin^2 x}$$ M1

$$= \frac{1 + 2\sin x \cos x}{(\cos x + \sin x)(\cos x - \sin x)}$$ M1A1

$$= \cos^2 x + \sin^2 x + 2\sin x \cos x$$

$$= (\cos x + \sin x)^2$$

$$= \frac{\cos x + \sin x}{\cos x - \sin x}$$

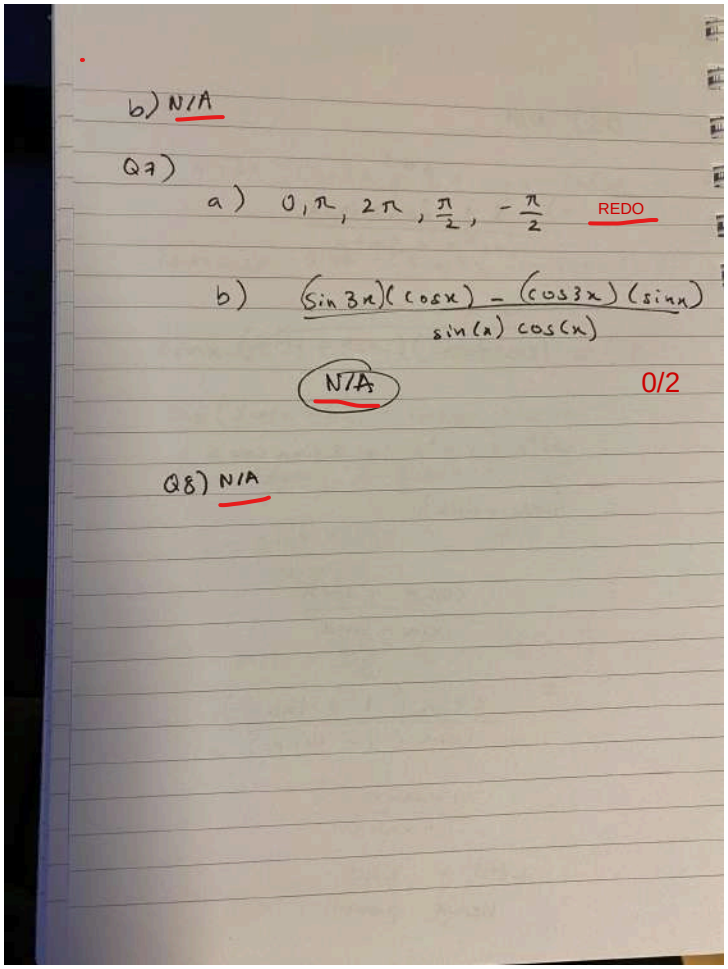
$$= \frac{\cos x (1 + \tan x)}{\cos x (1 - \tan x)}$$

$$= \frac{1 + \tan x}{1 - \tan x}$$ AG

LHS = RHS

Hence proven.

4/4



b) N/A

Q7)

a) $0, \pi, 2\pi, \frac{\pi}{2}, -\frac{\pi}{2}$ REDO

b) $$\frac{(\sin 3x)(\cos x) - (\cos 3x)(\sin x)}{\sin(x)\cos(x)}$$

N/A

0/2

Q8) N/A