PAST EXAMINATION QUESTIONS : TRIG IDENTITIES + EQNS

1. Given that A is an acute angle such that $\cos A = \frac{3}{5}$ find, without using tables or calculators, the value of (i) $\cos 2A$, (ii) $\tan 2A$, (iii) $\cos 4A$. (Sp2/7b)

2. Given that $\tan \theta = t$ where θ is acute, express in terms of t, (i) $\tan (\theta + 45°)$, (ii) $\cos \theta$. (J85/P2/14b)

3. Given that $\frac{\cos(A-B)}{\cos(A+B)} = \frac{7}{3}$, show that $5 \tan A = 2 \cot B$. Given further that A is acute and that $\tan B = 2$ find, without using tables or calculators, the value of (i) $\tan (A + B)$, (ii) $\sin A$, (iii) $\cos 2A$. (N85/P1/14)

4. The equations of a curve, in terms of a parameter θ, are given by $x = \sec \theta - \tan \theta$, $y = \sec \theta + 2 \tan \theta$. Express $\sec \theta$ and $\tan \theta$ in terms of x and y. Hence obtain, in simplified form, the cartesian equation of the curve. (N85/P1/16b)

5. Prove the identity $\sec^2 x + \operatorname{cosec}^2 x = \sec^2 x \operatorname{cosec}^2 x$. (J86/P1/6)

6. Given that $\cos \theta = c$ and that θ is acute, express, in terms of c, (i) $\operatorname{cosec} \theta$, (ii) $\cot \theta$ (iii) $\sin 2\theta$, (iv) $\tan (\theta + 45°)$. (N86/P2/4b)

7. Prove the identity $\frac{1+\sin x}{\cos x} + \frac{\cos x}{1+\sin x} = 2 \sec x$. (J87/P1/3)

8. Given that $\frac{\cos(A+B)}{\cos(A-B)} = \frac{3}{4}$, prove that $\cos A \cos B = 7 \sin A \sin B$ and deduce a relationship between $\tan A$ and $\tan B$. Given further that $A + B = 45°$, calculate the value of $\tan A + \tan B$. (J87/P2/4b)

9. For the curve whose equation is $x^2 + 4y^2 - 8y = 0$, a parametric form for y is given by $y = 1 + \sin \theta$. Obtain, in its simplest form, a corresponding parametric form for x. (J87/P2/8b)

10. Prove the identity $\operatorname{cosec} x - \sin x \equiv \cos x \cot x$. (N87/P1/3)

11. Given that $\sin \alpha = \frac{4}{5}$, where $90° < \alpha < 180°$, and that $\cos \beta = -\frac{5}{13}$, where $180° < \beta < 270°$, calculate, without using tables or calculators, (i) $\sin (\alpha - \beta)$, (ii) $\cos 2\alpha$, (iii) $\sin 2\beta$. (N87/P2/4a)

12. Prove the identity $\sec x \operatorname{cosec} x - \cot x \equiv \tan x$. (J88/P1/5)

13. Given that $\tan \theta = t$ and that θ is acute, express in terms of t, (i) $\sin \theta$, (ii) $\sin 2\theta$, (iii) $\cot (\theta + 45°)$. (J88/P2/3b)

1. (i) $-\frac{7}{25}$

(ii) $-3\frac{3}{7}$

(iii) $-\frac{527}{625}$ or $-0{\cdot}843$

2. (i) $\frac{1+1}{1-t}$ (ii) $\frac{1}{\sqrt{1+t^2}}$

3. (i) $3\frac{2}{3}$

(ii) $\frac{1}{\sqrt{26}}$

(iii) $\frac{12}{13}$

4. $\sec\theta = \frac{1}{3}(2x+y)$, $\tan\theta = \frac{1}{3}(y-x)$;
$x(x+2y) = 3$

6. (i) $-\frac{1}{\sqrt{1-c^2}}$ (ii) $\frac{c}{\sqrt{1-c^2}}$

8. $\tan A \times \tan B = \frac{1}{7}$; $\frac{6}{7}$

9. $x = \pm 2\cos\theta$

11. (i) $-\frac{56}{65}$

(ii) $-\frac{7}{25}$

(iii) $\frac{120}{169}$

13. (i) $\frac{1}{\sqrt{1+t^2}}$

(ii) $\frac{2t}{1+t^2}$

(iii) $\frac{1-t}{1+t}$