Ch 6 Revision

Trig (Identities and Equations)

Solomon D

2. Find, to 2 decimal places, the solutions of the equation

$$3\cot^2 x - 4\operatorname{cosec} x + \operatorname{cosec}^2 x = 0$$

in the interval $0 \le x \le 2\pi$. **(6)**

Solomon F

1. Solve the equation

$$3 \operatorname{cosec} \theta° + 8 \cos \theta° = 0$$

for θ in the interval $0 \leq \theta \leq 180$, giving your answers to 1 decimal place. **(6)**

Solomon J

6. *(a)* Prove the identity

$$2 \cot 2x + \tan x \equiv \cot x, \quad x \neq \tfrac{n}{2}\pi, \quad n \in \mathbb{Z}.$$ **(5)**

(b) Solve, for $0 \leq x < \pi$, the equation

$$2 \cot 2x + \tan x = \operatorname{cosec}^2 x - 7,$$

giving your answers to 2 decimal places. **(6)**

Solomon H

2. Giving your answers to 1 decimal place, solve the equation

$$5\tan^2 2\theta - 13\sec 2\theta = 1,$$

for θ in the interval $0 \le \theta \le 360°$. **(7)**

Solomon A

7. *(a)* *(i)* Show that

$$\sin (x + 30)° + \sin (x - 30)° \equiv a \sin x°,$$

where a is a constant to be found.

(ii) Hence find the exact value of $\sin 75° + \sin 15°$, giving your answer in the form $b\sqrt{6}$. **(6)**

(b) Solve, for $0 \le y \le 360$, the equation

$$2\cot^2 y° + 5\,\text{cosec}\, y° + \text{cosec}^2\, y° = 0.$$ **(6)**

Solomon C

2. *(a)* Prove, by counter-example, that the statement

"cosec θ – sin $\theta > 0$ for all values of θ in the interval $0 < \theta < \pi$"

is false. **(2)**

(b) Find the values of θ in the interval $0 < \theta < \pi$ such that

$$\text{cosec } \theta - \sin \theta = 2,$$

giving your answers to 2 decimal places. **(5)**

Solomon D

4. *(a)* Use the identities for (sin A + sin B) and (cos A + cos B) to prove that

$$\frac{\sin 2x + \sin 2y}{\cos 2x + \cos 2y} \equiv \tan (x + y).$$ **(4)**

(b) Hence, show that

$$\tan 52.5° = \sqrt{6} - \sqrt{3} - \sqrt{2} + 2.$$ **(5)**

Solomon E

2. *(a)* Prove that, for $\cos x \neq 0$,

$$\sin 2x - \tan x \equiv \tan x \cos 2x.$$ **(5)**

(b) Hence, or otherwise, solve the equation

$$\sin 2x - \tan x = 2\cos 2x,$$

for x in the interval $0 \leq x \leq 180°$. **(5)**

Solomon G

2. *(a)* Use the identities for $\cos(A + B)$ and $\cos(A - B)$ to prove that

$$2\cos A\cos B \equiv \cos(A + B) + \cos(A - B).$$ **(2)**

(b) Hence, or otherwise, find in terms of π the solutions of the equation

$$2\cos(x + \tfrac{\pi}{2}) = \sec(x + \tfrac{\pi}{6}),$$

for x in the interval $0 \leq x \leq \pi$. **(7)**

Solomon J

1. *(a)* Given that $\cos x = \sqrt{3} - 1$, find the value of $\cos 2x$ in the form $a + b\sqrt{3}$, where a and b are integers. **(3)**

(b) Given that

$$2\cos(y + 30)° = \sqrt{3}\sin(y - 30)°,$$

find the value of $\tan y$ in the form $k\sqrt{3}$ where k is a rational constant. **(5)**

Solomon K

1. *(a)* Find the exact value of x such that

$$3\arctan(x - 2) + \pi = 0.$$ **(3)**

(b) Solve, for $-\pi < \theta < \pi$, the equation

$$\cos 2\theta - \sin\theta - 1 = 0,$$

giving your answers in terms of π. **(5)**

Solomon L

5. Find the values of x in the interval $-180 < x < 180$ for which

$$\tan(x + 45)° - \tan x° = 4,$$

giving your answers to 1 decimal place. **(9)**

Solomon L

7. *(a)* Use the identity

$$\cos(A + B) \equiv \cos A \cos B - \sin A \sin B$$

to prove that

$$\cos x \equiv 1 - 2\sin^2 \tfrac{x}{2}.$$ **(3)**

(b) Prove that, for $\sin x \neq 0$,

$$\frac{1 - \cos x}{\sin x} \equiv \tan \tfrac{x}{2}.$$ **(3)**

(c) Find the values of x in the interval $0 \leq x \leq 360°$ for which

$$\frac{1 - \cos x}{\sin x} = 2\sec^2 \tfrac{x}{2} - 5,$$

giving your answers to 1 decimal place where appropriate. **(6)**

Solomon B

3. *(a)* Use the identities for $\sin(A+B)$ and $\sin(A-B)$ to prove that

$$\sin P + \sin Q \equiv 2\sin\frac{P+Q}{2}\cos\frac{P-Q}{2}.$$ **(4)**

(b) Find, in terms of π, the solutions of the equation

$$\sin 5x + \sin x = 0,$$

for x in the interval $0 \le x < \pi$. **(5)**

Solomon I

6. *(a)* Use the identities for $\cos(A+B)$ and $\cos(A-B)$ to prove that

$$\cos P - \cos Q \equiv -2\sin\frac{P+Q}{2}\sin\frac{P-Q}{2}.$$ **(4)**

(b) Hence find all solutions in the interval $0 \le x < 180$ to the equation

$$\cos 5x° + \sin 3x° - \cos x° = 0.$$ **(7)**