1

Find, in exact surd form, the only real solution of the following trigonometric equation

$$\arcsin(2x-1)-\arccos x=\frac{\pi}{6}.$$ (10)

2

Solve each of the following trigonometric equations.

a) $\tan\theta(1+\cos 2\theta)=2\sin^2 2\theta, \quad 0\le\theta\le 90°$ (5)

b) $4\tan 2\varphi+3\cot\varphi\sec^2\varphi=0, \quad 0\le\varphi<2\pi$ (5)

3

Solve each of the following trigonometric equations.

a) $\cos(\theta+30°)=\sin\theta, \quad 0\le\theta<360°$ (2)

b) $3\cos(x+30°)=\sin(x-60°), \quad 0\le x<360°$ (2)

c) $\sin(y-30°)=\sin(y+45°), \quad 0\le y<360°$ (2)

d) $\sin(\varphi+30°)=\cos(\varphi-45°), \quad 0\le\varphi<360°$ (2)

e) $\cos(\alpha-60°)=\cos(\alpha-45°), \quad 0\le\alpha<360°$ (2)

4

$$\sin A=\frac{1}{3} \text{ and } \cos B=\frac{1}{2}.$$

If A is obtuse and B is reflex, show clearly that

$$\sin(A+B)=\frac{1-a\sqrt{6}}{b}.$$ State a, b (10)

5

The point A lies on the y axis above the origin O and the point B lies on the y axis below the origin O.

The point $C(12,0)$ is at a distance of 20 units from A and at a distance of 13 units from B. (10)

By considering the tangent ratios of $\angle OCA$ and $\angle OCB$, show that the tangent of the angle ACB is exactly $\frac{c}{d}$. State c, d