Trig Identities and Equations Non Calc

1) (a) Show that $4-\cos 2\theta+5\sin\theta=2\sin^2\theta+5\sin\theta+3$. *[2 marks]*

(b) **Hence**, solve the equation $4-\cos 2\theta+5\sin\theta=0$ for $0\le\theta\le 2\pi$. *[5 marks]*

2) The straight line with equation $y=\frac{3}{4}x$ makes an acute angle θ with the *x*-axis.

(a) Write down the value of $\tan\theta$. *[1 mark]*

(b) Find the value of

(i) $\sin 2\theta$;

(ii) $\cos 2\theta$. *[6 marks]*

3) Solve $\cos 2x-3\cos x-3-\cos^2 x=\sin^2 x$, for $0\le x\le 2\pi$.

4) Let $f(x)=\sin^3 x+\cos^3 x\tan x$, $\frac{\pi}{2}<x<\pi$.

(a) Show that $f(x)=\sin x$. *[2 marks]*

(b) Let $\sin x=\frac{2}{3}$. Show that $f(2x)=-\frac{4\sqrt{5}}{9}$. *[5 marks]*

5) Let $p=\sin 40^\circ$ and $q=\cos 110^\circ$. Give your answers to the following in terms of *p* and/or *q*.

(a) Write down an expression for

(i) $\sin 140^\circ$;

(ii) $\cos 70^\circ$. *[2 marks]*

(b) Find an expression for $\cos 140^\circ$. *[3 marks]*

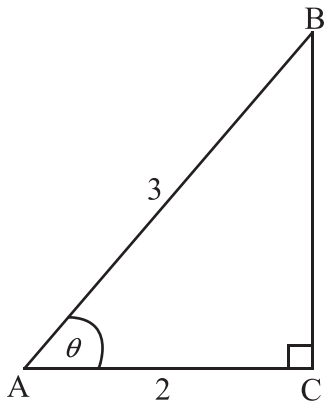
(c) Find an expression for $\tan 140^\circ$. *[1 mark]*

6)

(a) Given that $\cos A = \frac{1}{3}$ and $0 \le A \le \frac{\pi}{2}$, find $\cos 2A$. *[3 marks]*

(b) Given that $\sin B = \frac{2}{3}$ and $\frac{\pi}{2} \le B \le \pi$, find $\cos B$. *[3 marks]*

7) The following diagram shows a triangle ABC, where $A\hat{C}B$ is 90°, $AB = 3$, $AC = 2$ and $B\hat{A}C$ is θ.



(a) Show that $\sin\theta = \frac{\sqrt{5}}{3}$.

(b) Show that $\sin 2\theta = \frac{4\sqrt{5}}{9}$.

(c) Find the **exact** value of $\cos 2\theta$.

8) The function f is defined by $f : x \mapsto 30\sin 3x \cos 3x$, $0 \le x \le \frac{\pi}{3}$.

(a) Write down an expression for $f(x)$ in the form $a\sin 6x$, where a is an integer.

(b) Solve $f(x) = 0$, giving your answers in terms of π.