DOUBLE ANGLE IDENTITIES.

Note Title 12/4/2012

- FROM LAST DAY WHAT IF x AND y WERE EQUAL ?

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

$$\sin 2x = 2 \sin x \cos x$$

$$\cos(x+x) = \cos x \cos x - \sin x \sin x$$

$$\boxed{\cos 2x = \cos^2 x - \sin^2 x}$$

NOW WE USE THE PYTHAGOREAN IDENTITY

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

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

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

SO

$$\cos 2x = \cos^2 x - \sin^2 x$$
$$\cos 2x = (1 - \sin^2 x) - \sin^2 x$$
$$\boxed{\cos 2x = 1 - 2\sin^2 x}$$

$$\cos 2x = \cos^2 x - \sin^2 x$$
$$\cos 2x = \cos^2 x - (1 - \cos^2 x)$$
$$\cos^2 x - 1 + \cos^2 x$$
$$\boxed{\cos 2x = 2\cos^2 x - 1}$$

IE Prove $\dfrac{1 + \cos 2\theta}{\sin 2\theta} = \cot\theta$

$$\frac{\cancel{1+}\ 2\cos^2\theta\ \cancel{-1}}{2\sin\theta\cos\theta}$$

$$\frac{\cancel{2}\cos^{2}\theta}{\cancel{2}\sin\theta\ \cancel{\cos\theta}}$$

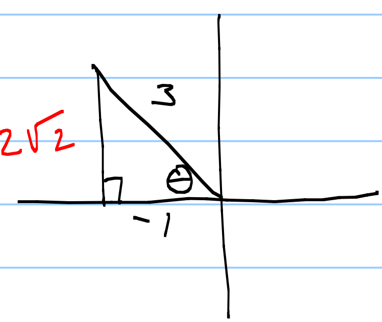
$$\frac{\cos\theta}{\sin\theta}$$

$$\cot\theta \qquad \text{QED.}$$

IE $\cos\theta = -\frac{1}{3}$ AND $\frac{\pi}{2} < \theta < \pi$

FIND $\sin\theta$ AND $\sin 2\theta$

SOLN



$$b^2 = 3^2 - (-1)^2$$

$$b^2 = 9 - 1$$

$$b^2 = 8$$

$$b = \sqrt{8} = 2\sqrt{2}$$

$$\sin\theta = \frac{2\sqrt{2}}{3}$$

$$\sin 2\theta = 2\sin\theta\cos\theta$$

$$2\left(\frac{2\sqrt{2}}{3}\right)\left(\frac{-1}{3}\right)$$

$$= \frac{-4\sqrt{2}}{9}$$

IE WRITE AS AN EXPRESSION OF A SINGLE TRIG FUNCTION.

(1) $2 \sin 0.6 \cos 0.6$

IT MATCHES $\sin 2\theta = 2 \sin\theta \cos\theta$

$\therefore \theta = 0.6$ $\qquad \sin 2(0.6) = \sin 1.2$

(2) $\cos^2(0.3) - \sin^2(0.3)$

$\cos 2\theta = \cos^2\theta - \sin^2\theta$

$\theta = 0.3$

$\therefore \cos 2\theta = \cos 2(0.3) = \cos(0.6)$

H/W Pg 44 SECTION 6.4

\# 1-5