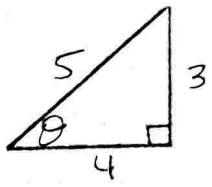
Double Angle Identities

1) $\sin\theta = \frac{3}{5}$
2) $\cos\theta = \frac{4}{5}$
3) $\tan\theta = \frac{3}{4}$
4) $\csc\theta = \frac{5}{3}$
5) $\sec\theta = \frac{5}{4}$
6) $\cot\theta = \frac{4}{3}$



7) $\sin 2\theta = 2\sin\theta\cos\theta = 2\left(\frac{3}{5}\right)\left(\frac{4}{5}\right) = \boxed{\frac{24}{25}}$

8) $\cos 2\theta = \cos^2\theta - \sin^2\theta = \left(\frac{4}{5}\right)^2 - \left(\frac{3}{5}\right)^2$
$= \frac{16}{25} - \frac{9}{25} = \boxed{\frac{7}{25}}$

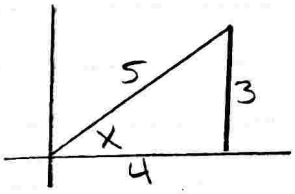
9) $\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta} = \frac{2\left(\frac{3}{4}\right)}{1-\left(\frac{3}{4}\right)^2} = \frac{\frac{6}{4}}{1-\frac{9}{16}} = \frac{\frac{3}{2}}{\frac{16}{16}-\frac{9}{16}} = \frac{\frac{3}{2}}{\frac{7}{16}}$
$= \frac{3}{2}\cdot\frac{16^8}{7} = \boxed{\frac{24}{7}}$

10) $\csc 2\theta = \boxed{\frac{25}{24}}$

11) $\sec 2\theta = \boxed{\frac{25}{7}}$

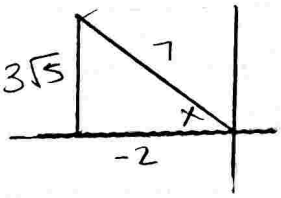
12) $\cot 2\theta = \boxed{\frac{7}{24}}$

13)



$\sin 2x = \frac{24}{25}$
$\cos 2x = \frac{7}{25}$
$\tan 2x = \frac{24}{7}$
} same as #7, 8, 9 above

14)



$(-2)^2 + b^2 = 7^2$
$b^2 = 49 - 4$
$b^2 = 45$
$\sqrt{b} = \sqrt{45} = 3\sqrt{5}$

$\sin 2x$
$= 2\sin x\cos x$
$= 2\left(\frac{3\sqrt{5}}{7}\right)\left(\frac{-2}{7}\right)$
$= \boxed{\frac{-12\sqrt{5}}{49}}$

$\cos 2x$
$= \cos^2 x - \sin^2 x$
$= \left(-\frac{2}{7}\right)^2 - \left(\frac{3\sqrt{5}}{7}\right)^2$
$= \frac{4}{49} - \frac{45}{49} = \boxed{\frac{-41}{49}}$

14) Continued...

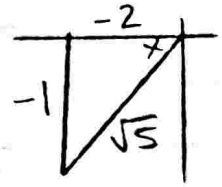
$$\tan 2x = \frac{2\tan x}{1-\tan^2 x} = \frac{2\left(\frac{3\sqrt{5}}{-2}\right)}{1-\left(\frac{3\sqrt{5}}{-2}\right)^2}$$

$$= \frac{\frac{6\sqrt{5}}{-2}}{1-\frac{45}{4}} = \frac{-3\sqrt{5}}{\frac{4}{4}-\frac{45}{4}} = \frac{-3\sqrt{5}}{\frac{-41}{4}} = \frac{3\sqrt{5}}{1}\cdot\frac{4}{41} = \boxed{\frac{12\sqrt{5}}{41}}$$

Note - another way to solve $\tan 2x$

$$\tan 2x = \frac{\sin 2x}{\cos 2x} = \frac{\frac{-12\sqrt{5}}{49}}{\frac{-41}{49}} = \frac{-12\sqrt{5}}{49}\cdot\frac{49}{-41} = \boxed{\frac{12\sqrt{5}}{41}}$$

15)



$(-1)^2+(-2)^2=c^2$
$1+4=c^2$
$5=c^2$
$\sqrt{5}=c$

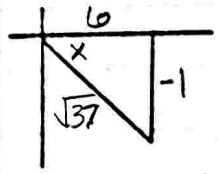
$$\sin 2x = 2\sin x\cos x = 2\left(\frac{-1}{\sqrt{5}}\right)\left(\frac{-2}{\sqrt{5}}\right) = \boxed{\frac{4}{5}}$$

$$\cos 2x = \cos^2 x - \sin^2 x = \left(\frac{-2}{\sqrt{5}}\right)^2 - \left(\frac{-1}{\sqrt{5}}\right)^2$$

$$= \frac{4}{5}-\frac{1}{5} = \boxed{\frac{3}{5}}$$

$$\tan 2x = \frac{\sin 2x}{\cos 2x} = \frac{\frac{4}{5}}{\frac{3}{5}} = \frac{4}{5}\cdot\frac{5}{3} = \boxed{\frac{4}{3}}$$

16)



$\cot x = \frac{-6}{1}$

$\tan x = -\frac{1}{6}$

$(-1)^2+(6)^2=c^2$
$1+36=c^2$
$37=c^2 \quad c=\sqrt{37}$

$$\sin 2x = 2\sin x\cos x = 2\left(\frac{-1}{\sqrt{37}}\right)\left(\frac{6}{\sqrt{37}}\right) = \boxed{\frac{-12}{37}}$$

$$\cos 2x = \cos^2 x - \sin^2 x = \left(\frac{6}{\sqrt{37}}\right)^2 - \left(\frac{-1}{\sqrt{37}}\right)^2$$

$$= \frac{36}{37}-\frac{1}{37} = \boxed{\frac{35}{37}}$$

$$\tan 2x = \frac{\sin x}{\cos x} = \frac{\frac{-12}{37}}{\frac{35}{37}} = \frac{-12}{37}\cdot\frac{37}{35} = \boxed{\frac{-12}{35}}$$