Pre – Calculus
Section 5.5 Practice

Name Key

For numbers 1 and 2, use the given information to find the exact value of each of the following.

a) $\sin 2\theta$ b) $\cos 2\theta$ c) $\tan 2\theta$

1. $\sin\theta = \frac{15}{17}, \theta, \frac{\pi}{2} < \theta < \pi$ (Q2)

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

$= 2\left(\frac{15}{17}\right)\left(\frac{-8}{17}\right)$

$= -\frac{240}{289}$

$1 - 2\sin^2\theta$

$1 - 2\left(\frac{15}{17}\right)^2$

$-\frac{514}{289}$

$\frac{2\tan\theta}{1-\tan^2\theta}$

$\frac{2\left(\frac{15}{-8}\right)}{1-\left(\frac{15}{-8}\right)^2}$

$\frac{\frac{15}{-4}}{-\frac{161}{64}}$

$\frac{960}{644}$ or $\frac{240}{161}$

2. $\cot\theta = 2, \cos\theta < 0$

$\tan = \frac{1}{2}$ $\tan \rightarrow +\pm$, $\cos \rightarrow -\pm$ Q3

a) $\sin 2\theta = 2\sin\theta\cos\theta$

$= 2\left(\frac{-1}{\sqrt{5}}\right)\left(\frac{-2}{\sqrt{5}}\right)$

$= \frac{4}{5}$

b) $1 - 2\sin^2\theta$

$1 - 2\left(\frac{-1}{\sqrt{5}}\right)^2$

$1 - \frac{2}{5}$

$\frac{3}{5}$

c) $\frac{2\left(\frac{1}{2}\right)}{1-\left(\frac{1}{2}\right)^2}$

$\frac{1}{1-\frac{1}{4}}$

$\frac{1}{\frac{3}{4}}$

$4/3$

For numbers 3 and 4, write each expression as the sine, cosine, or tangent of a double angle. Then find the exact value of the expression.

3. $2\sin 15^\circ \cos 15^\circ$

$\sin 2\theta$

$\sin 2(15^\circ)$

$\sin 30^\circ$

$\frac{1}{2}$

4. $2\cos^2\frac{\pi}{8} - 1$

$\cos 2\theta$

$\cos 2\left(\frac{\pi}{8}\right)$

$\cos\frac{\pi}{4}$

$\frac{\sqrt{2}}{2}$

For numbers 5 – 7, use a half-angle formula to find the exact value of each expression.

5. $\cos 22.5^\circ$

$\cos\frac{45^\circ}{2} = \pm\sqrt{\frac{1+\cos 45^\circ}{2}}$

$= \pm\sqrt{\frac{1+\frac{\sqrt{2}}{2}}{2}}$

$= \pm\sqrt{\frac{\frac{2+\sqrt{2}}{2}}{2}}$

$\pm\sqrt{\frac{2+\sqrt{2}}{4}}$

6. $\tan 112.5^\circ$

$\tan\frac{225^\circ}{2}$

$\frac{1-\cos 225^\circ}{\sin 225^\circ}$

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

$\frac{\frac{2+\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}}$

$\frac{-2+\sqrt{2}(\sqrt{2})}{\sqrt{2}(\sqrt{2})}$

$\frac{-2\sqrt{2}-2}{2}$

$-\sqrt{2}-1$

7. $\tan\frac{7\pi}{8}$

$\tan\frac{\frac{7\pi}{4}}{2}$

$\frac{1-\cos\frac{7\pi}{4}}{\sin\frac{7\pi}{4}}$

$\frac{1-\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}}$

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

$\frac{-2\sqrt{2}+2}{2}$

$-\sqrt{2}+1$