GPS Pre-Calculus Review
Sum/Difference and Multiple Angles

Name KEY
Period _____ Date _______________

I. Evaluate the given expressions using the information provided.

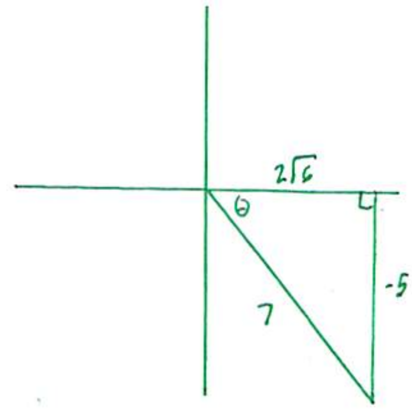
Given $\csc\theta = -\frac{7}{5}$ and $\sin\beta = \frac{1}{3}$, where $270° \le \theta \le 360°$ and $0° \le \beta \le 90°$

1. $\sec\theta = \boxed{\frac{7\sqrt{6}}{12}}$

$\frac{7}{2\sqrt{6}} = \frac{7\sqrt{6}}{12}$

2. $\tan\beta = \boxed{\frac{\sqrt{2}}{4}}$

$\frac{1}{2\sqrt{2}} = \frac{\sqrt{2}}{4}$

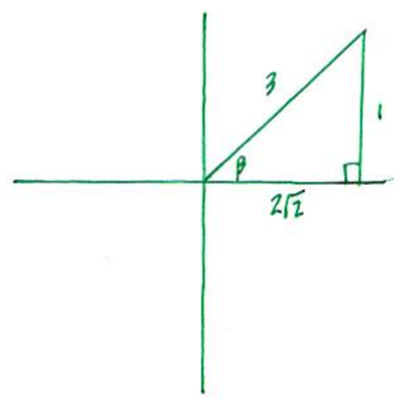


3. $\sin(\theta - \beta) = \boxed{\frac{-10\sqrt{2} - 2\sqrt{6}}{21}}$

$\sin\theta\cos\beta - \cos\theta\sin\beta$

$\left(\frac{-5}{7}\right)\left(\frac{2\sqrt{2}}{3}\right) - \left(\frac{2\sqrt{6}}{7}\right)\left(\frac{1}{3}\right)$

$\frac{-10\sqrt{2}}{21} - \frac{2\sqrt{6}}{21}$



4. $\cos(\beta + \theta) = \boxed{\frac{5 + 8\sqrt{3}}{21}}$

$\cos\beta\cos\theta - \sin\beta\sin\theta$

$\left(\frac{2\sqrt{2}}{3}\right)\left(\frac{2\sqrt{6}}{7}\right) - \left(\frac{1}{3}\right)\left(-\frac{5}{7}\right)$

$\frac{4\sqrt{12}}{21} + \frac{5}{21} = \frac{5 + 8\sqrt{3}}{21}$

5. $\sin 2\beta = \boxed{\frac{4\sqrt{2}}{9}}$

$2\sin\beta\cos\beta$

$\frac{2}{1}\left(\frac{1}{3}\right)\left(\frac{2\sqrt{2}}{3}\right) = \frac{4\sqrt{2}}{9}$

6. $\tan 2\theta = \boxed{20\sqrt{6}}$

$$\frac{2\tan\theta}{1 - \tan^2\theta} = \frac{2\left(\frac{-5}{2\sqrt{6}}\right)}{1 - \left(\frac{-5}{2\sqrt{6}}\right)^2} = \frac{\frac{-10}{2\sqrt{6}}}{1 - \frac{25}{24}} = \frac{\frac{-10}{2\sqrt{6}}}{\frac{24}{24} - \frac{25}{24}} = \frac{\frac{-10}{2\sqrt{6}}}{\frac{24-25}{24}} = \frac{\frac{-10}{2\sqrt{6}}}{\frac{-1}{24}} = \frac{-10}{2\sqrt{6}} \cdot \frac{24}{-1} = \frac{240}{2\sqrt{6}} = \frac{240\sqrt{6}}{12} = 20\sqrt{6}$$

II. Find the exact value of the expressions using the information provided.

6. $\sin 345° = \boxed{\dfrac{-\sqrt{6}+\sqrt{2}}{4}}$

$$\sin(300+45) = \sin 300 \cos 45 + \sin 45 \cos 300$$
$$= \left(\frac{-\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) + \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right)$$
$$\frac{-\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$$

7. $\cos \dfrac{7\pi}{12} = \boxed{\dfrac{\sqrt{2}-\sqrt{6}}{4}}$

$$\cos\left(\frac{\pi}{3}+\frac{\pi}{4}\right)$$
$$\cos \pi/3 \cos \pi/4 - \sin \pi/3 \sin \pi/4$$
$$\left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) - \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$$
$$\frac{\sqrt{2}}{4} - \frac{\sqrt{6}}{4}$$

III. Simplify and evaluate, if necessary, the given expressions using the information provided.

8. $\boxed{\dfrac{\sqrt{3}}{2}}$ $\cos\dfrac{\pi}{18}\cos\dfrac{2\pi}{9} + \sin\dfrac{\pi}{18}\sin\dfrac{2\pi}{9}$

$$\cos\left(\frac{\pi}{18} - \frac{2\pi}{9}\right)$$
$$\cos\left(\pi/18 - 4\pi/18\right)$$
$$\cos\left(-3\pi/18\right)$$
$$\cos\left(-\pi/6\right) = \frac{\sqrt{3}}{2}$$

9. $\boxed{\emptyset}$ $\dfrac{\tan\frac{\pi}{9} + \tan\frac{8\pi}{9}}{1 - \tan\frac{\pi}{9}\tan\frac{8\pi}{9}}$

$$\tan\left(\pi/9 + 8\pi/9\right)$$
$$\tan\left(9\pi/9\right)$$
$$\tan(\pi) = \emptyset$$