Test Review Day – Warm-up

$\boxed{\text{KEY}}$

$$\frac{9\pi}{12}+\frac{8\pi}{12} \rightarrow \frac{3\pi}{4}+\frac{2\pi}{3}$$
$$\alpha \quad \beta$$

1. Use a Sum or Difference Formula to find the value of tan $\left(\frac{17\pi}{12}\right)$ $= \tan\left(\frac{3\pi}{4}+\frac{2\pi}{3}\right)$

$$\frac{\tan\left(\frac{3\pi}{4}\right)+\tan\left(\frac{2\pi}{3}\right)}{1-\left[\tan\frac{3\pi}{4}\tan\left(\frac{2\pi}{3}\right)\right]} = \frac{(-1)+(-\sqrt{3})}{1-[(-1)(-\sqrt{3})]} = \frac{(-1-\sqrt{3})}{(1-\sqrt{3})}$$

Use the Conjugate!

$$\frac{(-1-\sqrt{3})(1+\sqrt{3})}{(1-\sqrt{3})(1+\sqrt{3})} = \frac{-1-\sqrt{3}-\sqrt{3}-3}{1-3} = \frac{-4-2\sqrt{3}}{-2} = \boxed{2+\sqrt{3}}$$ ✓

2. Evaluate $csc(330°)$

$$\frac{1}{\sin(330)} = \frac{1}{(-1/2)} = \frac{1}{1}\cdot\frac{-2}{1}$$

$$\boxed{-2}$$

3. Evaluate $cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

$$\boxed{\theta=\frac{\pi}{6} \text{ or } 30° \qquad \theta=\frac{11\pi}{6} \text{ or } 330°}$$

4. Evaluate $csc^{-1}\left(-\frac{2\sqrt{3}}{3}\right)$

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

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

$\boxed{\text{Q3 } \theta = 4\pi/3 \text{ or } 240° \quad \text{Q4 } \theta = 5\pi/3 \text{ or } 300°}$

5. Evaluate $sin^{-1}(3)$

$\boxed{\text{Undefined}}$

$\sin\theta$ can't be >1

5. Solve for θ. Give answers in radians.

$$\sqrt{3}tan(\theta)+1=0$$

$\tan\theta = \frac{-1}{\sqrt{3}}$ $\qquad \theta = \tan^{-1}(-\sqrt{3}/3)$

$\tan\theta = -\frac{\sqrt{3}}{3}$

$\boxed{\theta=\frac{5\pi}{6} \text{ Q2} \qquad \theta = 11\pi/6 \text{ Q4}}$

6. Solve for θ. Give answers in degrees.

$$10cos(\theta)+3=0$$

$\cos\theta = -\frac{3}{10}$ $\quad \theta = \cos^{-1}\left(\frac{-3}{10}\right)$

$\boxed{\theta = 107.46° \text{ (Q2)} \qquad \theta = 252.54° \text{ (Q4)}}$

$180-107.46 = 72.54$ (Reference Angle)

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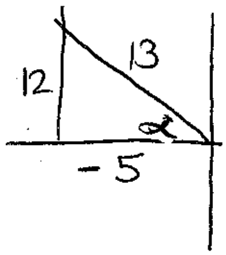
Key

Use the Sum/Difference Formulas to evaluate

Suppose that $\tan\alpha = -\frac{12}{5}$ and $\cos(\beta) = -\frac{24}{25}$, where

Q2 Q3

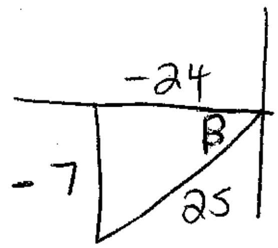
$\frac{\pi}{2} < \alpha < \pi$ **and** $\pi < \beta < \frac{3\pi}{2}$ **(set up a "cheat sheet!")**



$\sin\alpha = \frac{12}{13}$ +

$\cos\alpha = -\frac{5}{13}$ −

$\tan\alpha = -\frac{12}{5}$ −



$\sin\beta = \frac{-7}{25}$ −

$\cos\beta = -\frac{24}{25}$ −

$\tan\beta = \frac{7}{24}$ +

Find $cos(\alpha - \beta)$:

$\cos\alpha\cos\beta + \sin\alpha\sin\beta$

$\left(-\frac{5}{13}\right)\left(\frac{-24}{25}\right) + \left(\frac{12}{13}\right)\left(\frac{-7}{25}\right)$

$\frac{120}{325} + \left(\frac{-84}{325}\right)$

$$\boxed{\cos(\alpha-\beta) = \frac{36}{325}}$$

Find $tan(\alpha + \beta)$:

$$\frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta} = \frac{\left(-\frac{12}{5}\right) + \left(\frac{7}{24}\right)}{1 - \left[\left(-12/5\right)\left(7/24\right)\right]} = \frac{\left(-\frac{288}{120}\right) + \left(\frac{35}{120}\right)}{1 - \left[-84/120\right]}$$

$$\frac{\left(\frac{-253}{120}\right)}{\left(\frac{204}{120}\right)} = \frac{-253}{120} \cdot \frac{120}{204} = \boxed{\frac{-253}{204} = \tan(\alpha+\beta)}$$