WARMUP

1) Given $\tan\theta = \frac{7}{24} = \frac{y}{x}$ with θ in QIII

↳ x and y are negative

so $y = -7$, $x = -24$

so $r = 25$

Calculate $\sin\theta$ and $\cos\theta$

$\sin\theta = -\frac{7}{25}$

$\cos\theta = -\frac{24}{25}$

2) Given $\sec\alpha = \frac{41}{9} = \frac{r}{x}$ $\quad \frac{3\pi}{2} < \alpha < 2\pi$

QIV so $y < 0$

$y = -40$

Calculate $\sin\alpha$, $\cos\alpha$

$\sin\alpha = -\frac{40}{41}$ $\quad \cos\alpha = \frac{9}{41}$

Section 6.4 Continued

ex: Given $\tan\alpha = \frac{3}{4} = \frac{y}{x}$, α in QI

$y = 3$, $x = 4$, $r = 5$

$\sin\alpha = \frac{3}{5}$

$\cos\alpha = \frac{4}{5}$

$\sin\beta = \frac{7}{25} = \frac{y}{r}$, $90^\circ < \beta < 180^\circ$

QII $x < 0$

$y = 7$, $x = -24$, $r = 25$

$\sin\beta = \frac{7}{25}$

$\cos\beta = -\frac{24}{25}$

Find a) $\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

$r = 125$, $y = -44$

$= \frac{3}{5}\cdot\left(-\frac{24}{25}\right) + \frac{4}{5}\cdot\frac{7}{25} = \frac{-72}{125} + \frac{28}{125} = -\frac{44}{125} = \frac{y}{r}$

b) $\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

$x = -117$

$= \frac{4}{5}\cdot\left(-\frac{24}{25}\right) - \frac{3}{5}\cdot\frac{7}{25} = \frac{-96}{125} - \frac{21}{125} = -\frac{117}{125} = \frac{x}{r}$

c) $\tan(\alpha+\beta) = \frac{y}{x} = \frac{-44}{-117} = \frac{44}{117}$

d) Which quadrant is $(\alpha+\beta)$ in?

QIII because $x<0$ and $y<0$

Assignment

1) Find $\sin(\alpha-\beta)$, $\cos(\alpha-\beta)$, $\tan(\alpha-\beta)$, quadrant $\alpha-\beta$ if:

$\sin\alpha = \frac{3}{5}$ $\quad 0<\alpha<\frac{\pi}{2}$; $\quad \cos\beta = \frac{40}{41}$ $\quad \frac{3\pi}{2}<\beta<2\pi$

2) Find $\sin(\alpha+\beta)$, $\cos(\alpha+\beta)$, $\tan(\alpha+\beta)$, quadrant $\alpha+\beta$ if:

$\sec\alpha = -\frac{25}{7}$ $\quad \frac{\pi}{2}<\alpha<\pi$; $\quad \cot\beta = \frac{12}{5}$ $\quad \beta$ in QI

3) Establish the identity: $1 - \frac{\sin^2\theta}{1-\cos\theta} = -\cos\theta$