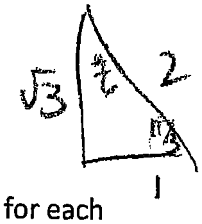
Pre-Calculus 12
Extra Practice (6.1 – 6.2)



Name : Key

1. Find an exact value for each

a) $\cos\frac{7\pi}{12}$

$\cos\left(\frac{3\pi}{12}+\frac{4\pi}{12}\right)$

$=\cos\left(\frac{\pi}{4}+\frac{\pi}{3}\right)$

$=\cos\frac{\pi}{4}\cos\frac{\pi}{3}-\sin\frac{\pi}{4}\sin\pi/3$

$=\frac{1}{\sqrt{2}}\cdot\frac{1}{2}-\frac{1}{\sqrt{2}}\cdot\frac{\sqrt{3}}{2}$

$=\frac{1-\sqrt{3}}{2\sqrt{2}}=\frac{\sqrt{2}-\sqrt{6}}{4}$

b) $\sin\frac{5\pi}{12}$

$\sin\left(\frac{3\pi}{12}+\frac{2\pi}{12}\right)$

$\sin\left(\frac{\pi}{4}+\frac{\pi}{6}\right)$

$\sin\pi/4\cos\frac{\pi}{6}+\cos\frac{\pi}{4}\sin\frac{\pi}{6}$

$\frac{1}{\sqrt{2}}\cdot\frac{\sqrt{3}}{2}+\frac{1}{\sqrt{2}}\cdot\frac{1}{2}$

$\frac{\sqrt{3}+1}{2\sqrt{2}}=\frac{\sqrt{6}+\sqrt{2}}{4}$

2. Expand and simplify

a) $\sin\left(\frac{\pi}{2}+\theta\right)+\sin\left(\frac{\pi}{2}-\theta\right)$

$\sin\frac{\pi}{2}\cos\theta+\cos\pi/2\sin\theta+\sin\pi/2\cos\theta-\cos\pi/2\sin\theta$

$(1)\cos\theta+0\cdot\sin\theta+(1)\cos\theta-0\sin\theta$

$2\cos\theta$

b) $\cos\left(\alpha-\frac{\pi}{3}\right)$

$\cos\alpha\cos\pi/3+\sin\alpha\sin\pi/3$

$\cos\alpha\left(\frac{1}{2}\right)+\sin\alpha\left(\frac{\sqrt{3}}{2}\right)$

$\frac{\cos\alpha+\sqrt{3}\sin\alpha}{2}$

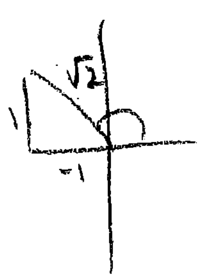
3. Simplify

a) $1-2\sin^2\left(\frac{3\pi}{8}\right)$

$=\cos\left(2\cdot\frac{3\pi}{8}\right)$

$=\cos\frac{3\pi}{4}$

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



b) $\frac{2\tan\frac{\pi}{8}}{1-\tan^2\frac{\pi}{8}}=\tan 2\left(\frac{\pi}{8}\right)$

$=\tan\frac{\pi}{4}$

$=1$

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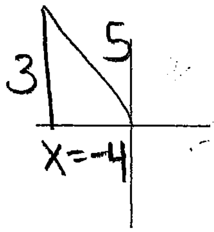
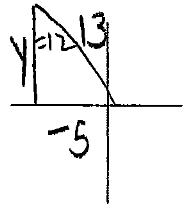
4. If $\sin \alpha = 3/5$, and $\cos \beta = -5/13$, and α and β are in quadrant II, find:



$$x^2 + y^2 = r^2$$
$$x^2 + 3^2 = 5^2$$
$$x^2 + 9 = 25$$
$$x^2 = 16$$
$$x = -4$$



$$x^2 + y^2 = r^2$$
$$(-5)^2 + y^2 = 13^2$$
$$25 + y^2 = 169$$
$$y^2 = 144$$
$$y = 12$$

a) $\sin(\alpha - \beta)$

$$\sin\alpha\cos\beta - \cos\alpha\sin\beta$$
$$\left(\frac{3}{5}\right)\left(\frac{-5}{13}\right) - \left(\frac{-4}{5}\right)\left(\frac{12}{13}\right)$$
$$\frac{-15}{65} + \frac{48}{65} = \frac{33}{65}$$

b) $\sin 2\beta$

$$= 2\sin\beta\cos\beta$$
$$= 2\left(\frac{12}{13}\right)\left(\frac{-5}{13}\right)$$
$$= \frac{-120}{169}$$

c) $\cos(\alpha + \beta)$

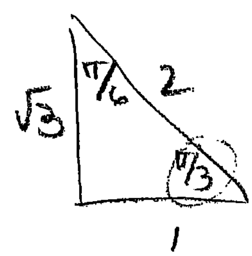
$$\cos\alpha\cos\beta - \sin\alpha\sin\beta$$
$$\left(\frac{-4}{5}\right)\left(\frac{-5}{13}\right) - \left(\frac{3}{5}\right)\left(\frac{12}{13}\right)$$
$$\frac{20}{65} - \frac{36}{65} = \frac{-16}{65}$$

d) $\cos 2\alpha$

$$= 2\cos^2\alpha - 1$$
$$= 2\left(\frac{-4}{5}\right)^2 - 1$$
$$= \frac{32}{25} - \frac{25}{25}$$
$$= \frac{7}{25}$$

5. Verify the identity for $\theta = \frac{\pi}{3}$

$$\cos\theta\cot\theta + \sin\theta = \csc\theta$$



$$\cos\frac{\pi}{3}\cot\frac{\pi}{3} + \sin\frac{\pi}{3} = \csc\frac{\pi}{3}$$
$$\left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{3}}\right) + \frac{\sqrt{3}}{2} = \frac{2}{\sqrt{3}}$$
$$\frac{1}{2\sqrt{3}} + \frac{\sqrt{3}}{2} = \frac{2}{\sqrt{3}}$$
$$\frac{1}{2\sqrt{3}} + \frac{3}{2\sqrt{3}} = \frac{2}{\sqrt{3}}$$
$$\frac{4}{2\sqrt{3}} = \frac{2}{\sqrt{3}}$$
$$\frac{2}{\sqrt{3}} = \frac{2}{\sqrt{3}}$$