Accelerated Pre-Calculus Name________________________
4.12 Practice – Evaluating with Sum or Difference Identities Date: ________

Use Sum or Difference Identities to find the exact value of each expression. **Do not use a calculator.**

**1.** $\cos\frac{13\pi}{12}$

$\frac{10}{12}+\frac{3}{12}=\frac{13}{12}$

$\frac{5\pi}{6}+\frac{\pi}{4}$

$*\cos(A+B)=\cos A\cos B-\sin A\sin B$

$\cos\left(\frac{5\pi}{6}+\frac{\pi}{4}\right)=\cos\left(\frac{5\pi}{6}\right)\cos(\pi/4)-\sin\left(\frac{5\pi}{6}\right)\sin(\pi/4)$

$\left(-\frac{\sqrt3}{2}\right)\left(\frac{\sqrt2}{2}\right)-\left(\frac{1}{2}\right)\left(\frac{\sqrt2}{2}\right)$

$-\frac{\sqrt6}{4}-\frac{\sqrt2}{4}\rightarrow\boxed{\frac{-\sqrt6-\sqrt2}{4}}$

**2.** $\tan\frac{\pi}{12}$

$\frac{4\pi}{12}-\frac{3\pi}{12}=\frac{1\pi}{12}$

$*\tan(A-B)=\frac{\tan A-\tan B}{1+\tan A\tan B}$

$\tan\left(\frac{\pi}{3}-\frac{\pi}{4}\right)=\frac{\tan\pi/3-\tan\pi/4}{1+\tan\pi/3\tan\pi/4}$

$\frac{\sqrt3-1}{1+(\sqrt3)(1)}=\boxed{\frac{\sqrt3-1}{1+\sqrt3}}$

**3.** $\sin\frac{\pi}{8}\cos\frac{7\pi}{8}-\cos\frac{\pi}{8}\sin\frac{7\pi}{8}$

$*\sin A\cos B-\cos A\sin B=\sin(A-B)$

$\sin\left(\frac{\pi}{8}-\frac{7\pi}{8}\right)\rightarrow\sin\left(\frac{-6\pi}{8}\right)\rightarrow$

$\sin(-3\pi/4)=\boxed{\frac{-\sqrt2}{2}}$

**4.** $\frac{\tan 80°+\tan 55°}{1-\tan 80°\tan 55°}$

$*\frac{\tan A+\tan B}{1-\tan A\tan B}=\tan(A+B)$

$\tan(80+55)\rightarrow\tan(135)=\boxed{-1}$

Use identities to simplify.

**5.** $\sin(\pi+x)$

$*\sin(A+B)=\sin A\cos B+\cos A\sin B$

$\sin(\pi+x)=\sin\pi\cos x+\cos\pi\sin x$

$=(0)\cos x+(-1)\sin x$

$=\boxed{-\sin x}$

**6.** $\tan(\pi+x)$

$*\tan(A+B)=\frac{\tan A+\tan B}{1-\tan A\tan B}$

$=\frac{\tan\pi+\tan x}{1-\tan\pi\tan x}=\frac{0+\tan x}{1-0(\tan x)}$

$\frac{\tan x}{1}\rightarrow\boxed{\tan x}$

$*\cos(A-B) = \cos A\cos B + \sin A \sin B$



$\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B}$

**7.** $\cos\left(x - \frac{3\pi}{4}\right)$

$\cos x \cos(3\pi/4) + \sin x \sin(3\pi/4)$

$\cos x\left(-\frac{\sqrt{2}}{2}\right) + \sin x\left(\frac{\sqrt{2}}{2}\right)$

$\frac{\sqrt{2}}{2}(\sin x - \cos x)$

**8.** $\tan\left(x + \frac{7\pi}{4}\right)$

$\dfrac{\tan x + \tan 7\pi/4}{1 - \tan x \tan 7\pi/4} \to \dfrac{\tan x - 1}{1 - \tan x(-1)}$

$= \boxed{\dfrac{\tan x - 1}{1 + \tan x}}$

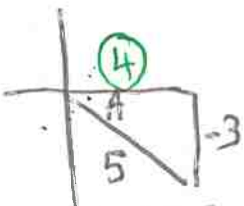
Suppose that $A$ and $B$ are angles in standard position. Use the given information to find:
(a) $\sin(A + B)$, (b) $\tan(A + B)$, and (c) the quadrant of $(A + B)$. **Do not use a calculator.**

S | A
T | C

**9.** $\sin A = -\frac{3}{5}$; $\cos B = -\frac{12}{13}$, $\frac{3\pi}{2} < A < 2\pi, \pi < B < \frac{3\pi}{2}$

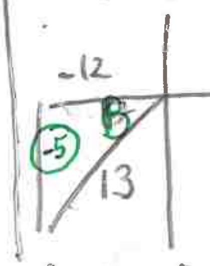
Q4 Q3

$\sin A = -\frac{3}{5}$




$(-3)^2 + b^2 = 5^2$

$\cos B = -\frac{12}{13}$




$(-12)^2 + b^2 = 13^2$

$b = 5$

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

(a) sin (A + B) = $16/65$

(b) tan (A + B) = $-16/63$

(c) Quadrant of (A + B) Q2

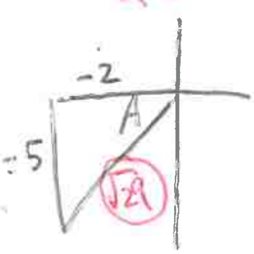
$\dfrac{\tan A + \tan B}{1 - \tan A \tan B} \to \dfrac{-\frac{3}{4} + \frac{5}{12}}{1 - (-3/4)(5/12)}$

**10.** $\cot A = \frac{2}{5}$, $\tan B = -\frac{4}{3}$, $\pi < A < \frac{3\pi}{2}$, $\frac{\pi}{2} < B < \pi$

Q3 Q2

$\tan A = 5/2$

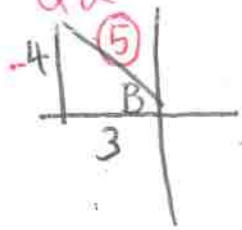
Q3




$2^2 + 5^2 = c^2$
$\sqrt{29} = c$

$\tan B = -\frac{4}{3}$

Q2




$\sin(A+B) =$
$\sin A \cos B + \cos A \sin B$
$\left(\frac{-5}{\sqrt{29}}\right)\left(\frac{3}{5}\right) + \left(\frac{-2}{\sqrt{29}}\right)\left(\frac{-4}{5}\right)$

(a) sin (A + B) = $\frac{7\sqrt{29}}{145}$

(b) tan (A + B) = $7/26$

(c) Quadrant of (A + B) Q1

$\frac{-15}{5\sqrt{29}} + \frac{8}{5\sqrt{29}} = \frac{7}{5\sqrt{29}}$

$\frac{7\sqrt{29}}{145}$

b) $\tan(A+B) = \dfrac{\tan A + \tan B}{1 - \tan A \tan B} = \dfrac{\frac{5}{2} - 4/3}{1 - (5/2)(-4/3)}$

$= \boxed{\dfrac{7}{26}}$