Table of Trigonometric Identities

Reciprocal Identities

$\sin u = \frac{1}{\csc u}$ $\cos u = \frac{1}{\sec u}$ $\tan u = \frac{1}{\cot u}$

$\csc u = \frac{1}{\sin u}$ $\sec u = \frac{1}{\cos u}$ $\cot u = \frac{1}{\tan u}$

Pythagorean Identities

$\sin^2 u + \cos^2 u = 1$

$1 + \tan^2 u = \sec^2 u$

$1 + \cot^2 u = \csc^2 u$

Quotient Identities

$\tan u = \frac{\sin u}{\cos u}$ $\cot u = \frac{\cos u}{\sin u}$

Co-Function Identities

$\sin(\pi/2 - u) = \cos u$

$\cos(\pi/2 - u) = \sin u$

Even-Odd Identities

$\sin(-u) = -\sin u \quad \cos(-u) = \cos u$

$\csc(-u) = -\csc u \quad \sec(-u) = \sec u$

$\tan(-u) = -\tan u$

$\cot(-u) = -\cot u$

Sum-Difference Formulas

$\sin(u+v) = \sin u \cos v + \cos u \sin v$
$\sin(u-v) = \sin u \cos v - \cos u \sin v$

$\cos(u+v) = \cos u \cos v - \sin u \sin v$
$\cos(u-v) = \cos u \cos v + \sin u \sin v$

$$\tan(u+v) = \frac{\tan u + \tan v}{1 - \tan u \tan v}$$

$$\tan(u-v) = \frac{\tan u - \tan v}{1 + \tan u \tan v}$$

Trig Identities

① Draw vertical line through =
You Cannot move things across the =

② Use identities or math rules to get the sides to be exactly the same.

③ Hints:
① start on more complicated side
② Rewrite one side (both sides in terms of sine & cosine)

Ex1 $\csc\theta \cdot \tan\theta = \sec\theta$

#1 $\csc\theta \cdot \cos\theta = \cot\theta$

Ex2 $\sin^2(-\theta) + \cos^2(-\theta) = 1$

Ex3 $\dfrac{\sin^2(-\theta) - \cos^2(-\theta)}{\sin(-\theta) - \cos(-\theta)} = \cos\theta - \sin\theta$

#3 $1 + \tan^2(-\theta) = \sec^2\theta$

Ex4 $\dfrac{1 + \tan\theta}{1 + \cot\theta} = \tan\theta$

#9 $(\sec\theta - 1)(\sec\theta + 1) = \tan^2\theta$

HW: 5-19 odd

Sum / Difference Formulas

one angle

① Convert to degrees if necessary

② find two ∠'s from chart that add or subtract to get #1

③ Write formula – substitute
Simplify

two angles

① Draw & label triangles

② Write formula – substitute – simplify

3. $\cos \frac{7\pi}{12} =$

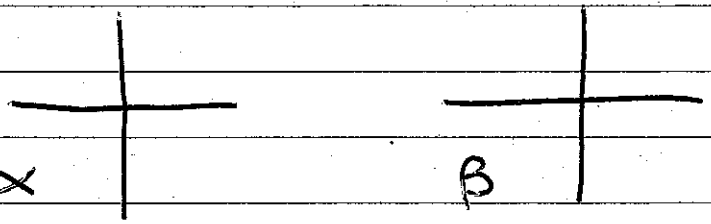
7. $\tan 15^\circ$

9. $\sin \frac{17\pi}{12} =$

13.

17.

23.



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

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

c) $\sin(\alpha-\beta)=$

d) $\tan(\alpha-\beta)=$

HW: 1, 5, 8, 11, 14-24 even, 36, 38

Double ∠ formulas

$\sin 2\theta = 2\sin\theta\cos\theta$

$\cos 2\theta = \cos^2\theta - \sin^2\theta$

$\cos 2\theta = 1 - 2\sin^2\theta$

$\cos 2\theta = 2\cos^2\theta - 1$

Find $\sin 2\theta$ and $\cos 2\theta$

Given: ① $\sin\theta = 3/5$ $\quad \pi/2 < \theta < \pi$

② $\cot\theta = 3$ $\quad \cos\theta < 0$

Verify: ① $\cos^4\theta - \sin^4\theta = \cos 2\theta$

② $\cot 2\theta = 1/2(\cot\theta - \tan\theta)$

Solve trig eqs:
(like $4\sin\theta = 3$)

1. isolate trig ratio
2. Is # in chart?
   a) Yes: list all $\angle$'s
   b) NO: use calc (2^{nd} trig ratio) and ref $\angle$ formulas

Ex $-3\sec\theta = 2\sqrt{3}$

Ex $\frac{1}{2}\cos\theta = \frac{1}{4}$

Ex $4\sin\theta = 3$

Ex $-2\tan\theta = \sqrt{5}$

like $\cos 2\theta = 1/2$

CANNOT Divide by 2

① Find answers from chart or calc.

② ÷ by # in front of θ

Ex| $\tan 4\theta = \sqrt{3}$

Ex| $\cos 2\theta = 1/2$

If a ratio is squared...

① rewrite with one trig ratio

② factor

③ solve

④ look in chart or calc + ref ∠

Ex| $2\cos^2\theta - 3\cos\theta + 1 = 0$

Ex| $3\sin\theta + 3 = 2\cos^2\theta$