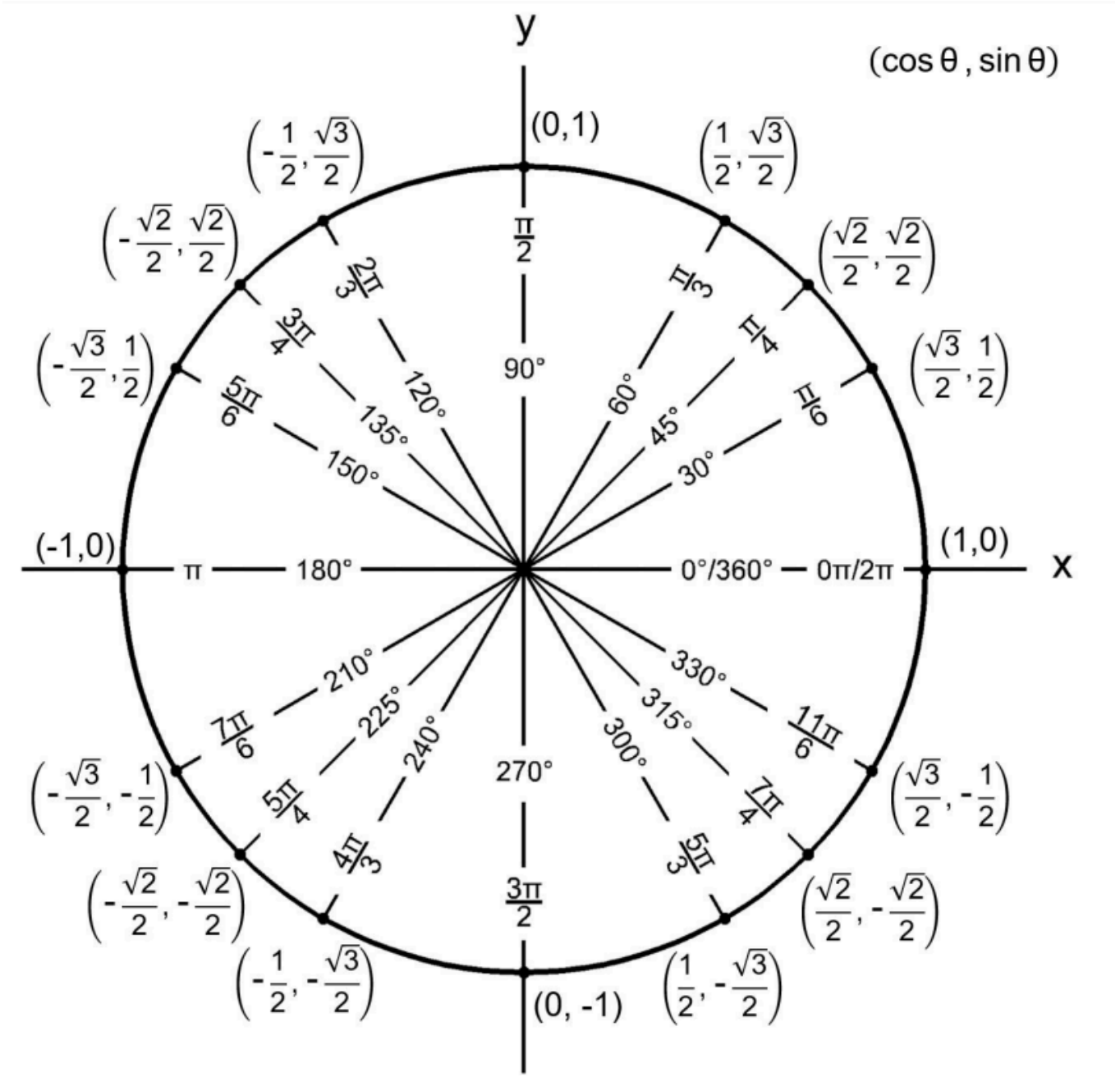
STUDENT SUCCESS CENTER
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

Trigonometry Review

Unit Circle:



Trigonometric Identities:

- **Reciprocal**
  - $sin\theta = \frac{1}{csc\theta}$
  - $cos\theta = \frac{1}{sec\theta}$
  - $tan\theta = \frac{1}{cot\theta}$
  - $csc\theta = \frac{1}{sin\theta}$
  - $sec\theta = \frac{1}{cos\theta}$
  - $cot\theta = \frac{1}{cot\theta}$
- **Pythagorean**
  - $sin^2\theta + cos^2\theta = 1$
  - $tan^2\theta + 1 = sec^2\theta$
  - $1 + csc^2\theta = cot^2\theta$
- **Double Angle**
  - $sin2\theta = 2sin\theta cos\theta$
  - $cos2\theta = 1 - 2sin^2\theta$
  - $tan2\theta = \frac{2tan\theta}{1-tan^2\theta}$
- **Sum to Product**
  - $sinu + sinv = 2sin(\frac{u+v}{2})cos(\frac{u-v}{2})$
  - $sinu - sinv = 2cos(\frac{u+v}{2})sin(\frac{u-v}{2})$
  - $cosu + cosv = 2cos(\frac{u+v}{2})cos(\frac{u-v}{2})$
  - $cosu - cosv = -2sin(\frac{u+v}{2})sin(\frac{u-v}{2})$
- **Even and Odd Functions**
  - $sin(-\theta) = -sin(\theta)$
  - $cos(-\theta) = cos(\theta)$
  - $tan(-\theta) = -tan(\theta)$
  - $csc(-\theta) = -csc(\theta)$
  - $sec(-\theta) = sec(\theta)$
  - $cot(-\theta) = -cot(\theta)$
- **Quotient**
  - $tan\theta = \frac{sin\theta}{cos\theta}$
  - $cot\theta = \frac{csc\theta}{sec\theta}$
- **Sum and Difference**
  - $sin(u \pm v) = sin(u)cos(v) \pm cos(u)sin(v)$
  - $cos(u \pm v) = cos(u)cos(v) \pm sin(u)sin(v)$
  - $tan(u \pm v) = \frac{tan(u)\pm tan(v)}{1\pm tan(u)tan(v)}$
- **Half Angle**
  - $sin^2\theta = \frac{1-cos2\theta}{2}$
  - $cos^2\theta = \frac{1+cos2\theta}{2}$
  - $tan^2\theta = \frac{1-cos2\theta}{1+cos2\theta}$
- **Product to Sum**
  - $sinu \cdot sinv = \frac{1}{2}[cos(u-v) - cos(u+v)]$
  - $cosu \cdot cosv = \frac{1}{2}[cos(u-v) + cos(u+v)]$
  - $sinu \cdot cosv = \frac{1}{2}[sin(u+v) + sin(u-v)]$
  - $cosu \cdot sinv = \frac{1}{2}[sin(u+v) - sin(u-v)]$

Inverse Trigonometric Functions:

• Function	• Domain	• Range
$\sin^{-1}\theta = \arcsin\theta$	[-1,1]	$\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$
$\cos^{-1}\theta = \arccos\theta$	[-1,1]	$[0,\pi]$
$\tan^{-1}\theta = \arctan\theta$	$(-\infty,\infty)$	$\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$
$\cot^{-1}\theta = \operatorname{arccot}\theta$	$(-\infty,\infty)$	$\left[-\frac{\pi}{2},0\right) \cup \left(0,\frac{\pi}{2}\right]$
$\sec^{-1}\theta = \operatorname{arcsec}\theta$	$(-\infty,-1] \cup [1,\infty)$	$\left[0,\frac{\pi}{2}\right) \cup \left(\frac{\pi}{2},\pi\right]$
$\csc^{-1}\theta = \operatorname{arccsc}\theta$	$(-\infty,-1] \cup [1,\infty)$	$\left[-\frac{\pi}{2},0\right) \cup \left(0,\frac{\pi}{2}\right]$