A.P. Calculus AB Trigonometry Review

Note: Almost all problems involving trigonometry in calculus will be in radians

RIGHT TRIANGLES (SOH-CAH-TOA):

$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$ $\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$ $\tan\theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{\sin\theta}{\cos\theta}$

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

IDENTITIES

Pythagorean

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

divide by $\sin^2\theta$ to get: $1 + \cot^2\theta = \csc^2\theta$

divide by $\cos^2\theta$ to get: $\tan^2\theta + 1 = \sec^2\theta$

Double Angle

$\sin(2\theta) = 2\sin\theta\cos\theta$

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

ODD/EVEN

sinx is an odd function, so $\sin(-\theta) = -\sin\theta$ cosx is an even function, so $\cos(-\theta) = \cos\theta$

OTHER STUFF

~~$\sin(\pi - \theta) = \sin\theta$ $\cos(\pi - \theta) = -\cos\theta$ $\cos(x - \frac{\pi}{2}) = \cos(\frac{\pi}{2} - x) = \sin x$ $\sin(\frac{\pi}{2} - x) = \cos x$~~

UNIT CIRCLE VALUES

Must know the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}$ and all of their multiples

GRAPHS

Must also be able to identify the domain, range, and locations of the asymptotes (if any) for all trigonometric functions. Must be able to use the features below to sketch the graph.

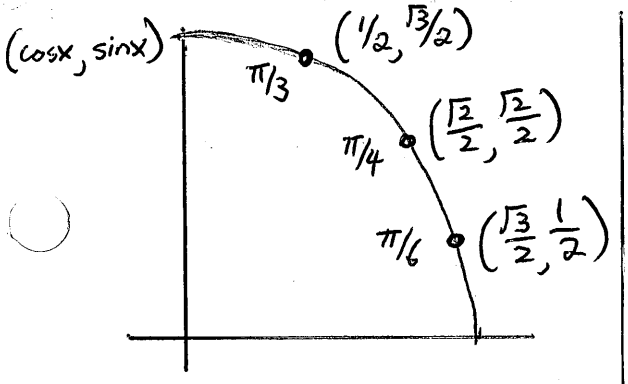
For $y = a\sin bx$ or $y = a\cos bx$, period $= \frac{2\pi}{|b|}$, amplitude $= |a|$

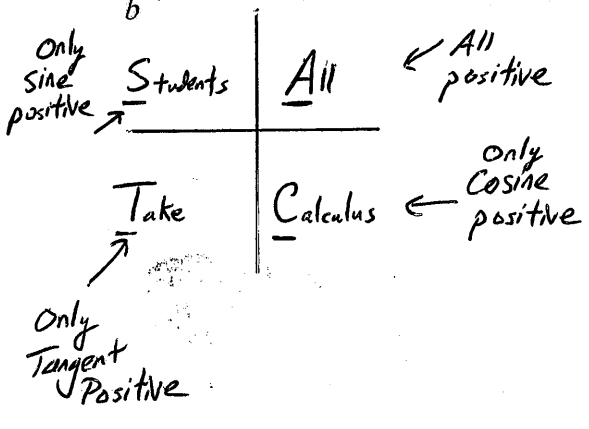
For $y = a\tan bx$ or $y = a\cot bx$, period $= \frac{\pi}{|b|}$, amplitude is not applicable

For $y = a\sec bx$ or $y = a\csc bx$, period $= \frac{2\pi}{|b|}$, amplitude is not applicable

~~For all functions $y = a\sin b(x + c) + d$, phase shift $= c$ (left or right), vertical shift $= d$ (up or down)~~

For all functions $y = a\sin(bx + c) + d$, phase shift $= \frac{c}{b}$ (left or right), vertical shift $= d$ (up or down)





Log Properties

Log/Exponent Properties:

$\ln(1) = 0$

$\ln(e) = 1$

$\ln(a^n) = n * \ln(a)$

$\ln(ab) = \ln(a) + \ln(b)$

$\ln\left(\frac{a}{b}\right) = \ln a - \ln b$

$e \approx 2.718$

$$a^{\log_a x} = x$$

$$\log_a a^x = x$$

Change of Base:

$$\log_a x = \frac{\ln x}{\ln a}$$

Exponent Properties:

$e^a e^b = e^{a+b}$ $\quad (e^a)^b = e^{ab}$ $\quad e^0 = 1$

$\ln e^x = x$ $\quad \ln x = \log_e x$ $\quad \log x = \log_{10} x$ $\quad e^{\ln x} = x$