MATH 135 Lecture Notes
October 31, 2006

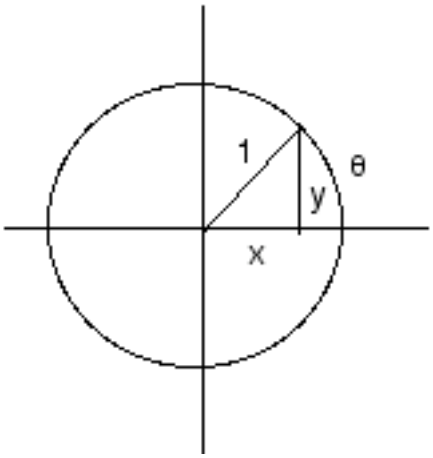
Sections 7.1 & 7.2
Trigonometric Functions

Degrees and Radians: $180^o = \pi$ *radians*

Special Angles:

$30^o = \frac{\pi}{6}$ $45^o = \frac{\pi}{4}$ $60^o = \frac{\pi}{3}$ $90^o = \frac{\pi}{2}$

Unit Circle Definitions



$\sin\theta = y$ $\quad \cot\theta = \frac{x}{y} = \frac{\cos\theta}{\sin\theta}$

$\cos\theta = x$ $\quad \sec\theta = \frac{1}{x} = \frac{1}{\cos\theta}$

$\tan\theta = \frac{y}{x} = \frac{\sin\theta}{\cos\theta}$ $\quad \csc\theta = \frac{1}{y} = \frac{1}{\sin\theta}$

Second Quadrant: x is negative; y is positive.

$\cos(\pi - \theta) = -\cos\theta$ $\quad \sin(\pi - \theta) = \sin\theta$

Third Quadrant: x is negative; y is negative.

$\cos(\pi + \theta) = -\cos\theta$ $\quad \sin(\pi + \theta) = -\sin\theta$

Fourth Quadrant: x is positive; y is negative. (7-9) page 233

$\cos(2\pi - \theta) = \cos(-\theta) = \cos\theta$ $\quad \sin(2\pi - \theta) = \sin(-\theta) = -\sin\theta$

Graphs of $y = a\sin(bx + c)$ and $y = a\cos(bx + c)$

Amplitude = $|a|$. Period = $\frac{2\pi}{b}$ Displacement = $-\frac{c}{b}$ page 230

Pythagorean Identities: On the Unit Circle $x^2 + y^2 = 1$. Therefore

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

$\tan^2\theta + 1 = \sec^2\theta$ (7-6) through (7-8) page 233.

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

Complementary Angles

$\cos\theta = \sin(\frac{\pi}{2} - \theta)$ $\sin\theta = \cos(\frac{\pi}{2} - \theta)$ (7-14) and (7-15) pages 234-235.

Sum and Difference Formulas

$\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$
$\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$ (7-12), (7-13), (7-16), (7-17) pages 234-235

Double Angle Formulas

$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha = 2\cos^2\alpha - 1 = 1 - 2\sin^2\alpha$
$\sin 2\alpha = 2\sin\alpha\cos\alpha$ (7-20) through (7-23) page 236

Half Angle Formulas

$\cos\frac{\alpha}{2} = \pm\sqrt{\frac{1+\cos\alpha}{2}}$
$\sin\frac{\alpha}{2} = \pm\sqrt{\frac{1-\cos\alpha}{2}}$ (7-25) and (7-26) page 236

Parts of Circles (s for length of arc; A for area of sector)
When $\theta = 2\pi$ you have a complete circle.

$s = \theta r$ $A = \frac{1}{2}\theta r^2$ (7-27) and (7-28) pages 236-237

Exercises:

Pages 231-232: 5, 7, 9, 11, 21, 25, 29, 31, 33, 37, 39, 41
Pages 237-238: 1, 3, 5, 7, 15, 33, 35