MATH 221: Calculus and Analytic Geometry
Prof. Ram, Fall 2006

HOMEWORK 2: SELECTED ANSWERS

Problem A. Angles

(1) The number π is the circumference of a circle divided by its diameter.

(2) $360^\circ = 2\pi$ radians.

(4) $2\pi r$ (5) $r\theta$ (6) πr^2 (7) $(1/2)\theta r^2$

Problem B. Computing trigonometric functions

(1) $\sin\frac{\pi}{6} = 1/2, \quad \cos\frac{\pi}{6} = \sqrt{3}/2, \quad \tan\frac{\pi}{6} = \sqrt{3}/3,$
$\cot\frac{\pi}{6} = \sqrt{3}, \quad \sec\frac{\pi}{6} = 2\sqrt{3}/3, \quad \csc\frac{\pi}{6} = 2.$

(2) $\sin\frac{\pi}{3} = \sqrt{3}/2, \quad \cos\frac{\pi}{3} = 1/2, \quad \tan\frac{\pi}{3} = \sqrt{3},$
$\cot\frac{\pi}{3} = \sqrt{3}/3, \quad \sec\frac{\pi}{3} = 2, \quad \csc\frac{\pi}{3} = 2\sqrt{3}/3.$

(3) $\sin\frac{\pi}{4} = \sqrt{2}/2, \quad \cos\frac{\pi}{4} = \sqrt{2}/2, \quad \tan\frac{\pi}{4} = 1,$
$\cot\frac{\pi}{4} = 1, \quad \sec\frac{\pi}{4} = \sqrt{2}, \quad \csc\frac{\pi}{4} = \sqrt{2}.$

(4) $\sin\frac{\pi}{2} = 1, \quad \cos\frac{\pi}{2} = 0, \quad \tan\frac{\pi}{2}$ is undefined,
$\cot\frac{\pi}{2} = 0, \quad \sec\frac{\pi}{2}$ is undefined, $\quad \csc\frac{\pi}{2} = 1.$

(5) $\sin 0 = 0, \quad \cos 0 = 1, \quad \tan 0 = 0,$
$\cot 0$ is undefined, $\quad \sec 0 = 1, \quad \csc 0$ is undefined.

(6) $\sin\frac{3\pi}{4} = \sqrt{2}/2, \quad \cos\frac{3\pi}{4} = -\sqrt{2}/2, \quad \tan\frac{3\pi}{4} = -1,$
$\cot\frac{3\pi}{4} = -1, \quad \sec\frac{3\pi}{4} = -\sqrt{2}, \quad \csc\frac{3\pi}{4} = \sqrt{2}.$

(7) $\sin\frac{-2\pi}{3} = -\sqrt{3}/2, \quad \cos\frac{-2\pi}{3} = -1/2, \quad \tan\frac{-2\pi}{3} = \sqrt{3},$
$\cot\frac{-2\pi}{3} = \sqrt{3}/3, \quad \sec\frac{-2\pi}{3} = -2, \quad \csc\frac{-2\pi}{3} = -2\sqrt{3}/3.$

(8) $\dfrac{1+\sqrt{3}}{2}$ (9) $\frac{\sqrt{3}}{4}$ (10) 1