

MATH 221: Calculus and Analytic Geometry
Prof. Ram, Fall 2004

HOMEWORK 1: SELECTED ANSWERS

Problem A. Computing with complex numbers

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|--------------------------------------|------------------|---|
| (1) $z = 0.$ | (2) $x = 1.$ | (3) $5 - 2i$ |
| (4) $-19 + 8i$ | (5) $32 + 4i$ | (6) $-2.9 + 1.7i$ |
| (7) $-9 - 46i$ | (8) $\pm(1 + i)$ | (9) $\frac{a}{a^2 + b^2} - \frac{b}{a^2 + b^2}i.$ |
| (10) $10 - 3i$ | (11) $2 + 4i$ | (12) $14 - 8i$ |
| (13) $\frac{11}{10} - \frac{4}{5}i.$ | | |

Problem B. Vocabulary

- (1) $\tan x = \frac{\sin x}{\cos x}.$
- (2) $\cot x = \frac{\cos x}{\sin x}.$
- (3) $\sec x = \frac{1}{\cos x}.$
- (4) $\csc x = \frac{1}{\sin x}.$
- (5) The number π is the circumference of a circle divided by its diameter.
- (6) $360^\circ = 2\pi$ radians.
- (8) $2\pi r$ (9) $r\theta$ (10) πr^2 (11) $(1/2)\theta r^2$

Problem C. 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) $\sin \frac{\pi}{3} = \sqrt{3}/2, \quad \cos \frac{\pi}{3} = 1/2, \quad \tan \frac{\pi}{3} = \sqrt{3},$

$$\cot \frac{\pi}{3} = \sqrt{3}/3, \quad \sec \frac{\pi}{3} = 2, \quad \csc \frac{\pi}{3} = 2\sqrt{3}/3.$$

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

$$\cot \frac{\pi}{4} = 1, \quad \sec \frac{\pi}{4} = \sqrt{2}, \quad \csc \frac{\pi}{4} = \sqrt{2}.$$

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

$$\cot \frac{\pi}{2} = 0, \quad \sec \frac{\pi}{2} \text{ is undefined,} \quad \csc \frac{\pi}{2} = 1.$$

$$(5) \quad \sin 0 = 0, \quad \cos 0 = 1, \quad \tan 0 = 0,$$

$$\cot 0 \text{ is undefined,} \quad \sec 0 = 1, \quad \csc 0 \text{ is undefined.}$$

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

$$\cot \frac{3\pi}{4} = -1, \quad \sec \frac{3\pi}{4} = -\sqrt{2}, \quad \csc \frac{3\pi}{4} = \sqrt{2}.$$

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

$$\cot \frac{-2\pi}{3} = \sqrt{3}/3, \quad \sec \frac{-2\pi}{3} = -2, \quad \csc \frac{-2\pi}{3} = -2\sqrt{3}/3.$$

$$(8) \quad \frac{1 + \sqrt{3}}{2}$$

$$(9) \quad \frac{1 + \sqrt{2}}{2}$$

$$(10) \quad \frac{\sqrt{2} - 2}{2}$$

$$(11) \quad \frac{\sqrt{3}}{4}$$

$$(12) \quad 1$$