

Math 251-L10

Trigonometry Review Sheet

1. Given a triangle ABC, with $\overline{BC} = a$, $\overline{AB} = c$, $\overline{AC} = b$, show that

i.
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

ii.
$$a^2 = b^2 + c^2 - 2bc \cos A$$

iii.
$$\text{Area } \Delta ABC = \frac{1}{2} bc \sin A$$

2. Given a right triangle ABC with right angle at the vertex B, and with $\overline{BC} = a$, $\overline{AB} = c$, $\overline{AC} = b$, show that

$$b^2 = c^2 + a^2$$

3. Given that for any $x, y \in \mathbb{R}$

$$\cos(x + y) = \cos x \cos y - \sin x \sin y$$

prove the following identities:

i.
$$\sin(x + y) = \sin x \cos y + \cos x \sin y$$

ii.
$$\cos 2x = 2 \cos^2 x - 1 = 1 - 2 \sin^2 x$$

iii.
$$\sin 3x = 3 \sin x - 4 \sin^3 x$$

iv.
$$\cos 3x = 4 \cos^3 x - 3 \cos x$$

v.
$$\sin x + \cos x = \sqrt{2} \sin \left(\frac{\pi}{4} + x \right) = \sqrt{2} \cos \left(\frac{\pi}{4} - x \right)$$

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4. Draw graphs of the following functions for $-2\pi \leq x \leq 2\pi$
- a. $y = \sin x$
 - b. $y = \cos x$
 - c. $y = \tan x$
 - d. $y = \sec x$
 - e. $y = \csc x$
 - f. $y = \cot x$
5. A triangle ABC has sides of length a, b, and c. If the perimeter of this triangle is denoted by 2s, show that the area of the triangle is given by

$$\text{Area } \Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$$