University of Calgary
Faculty of Science
Department of Mathematics and Statistics

Trigonometry Review Sheet

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

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

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

   iii. $Area\ \Delta\ ABC = \dfrac{1}{2}\, bc \sin A$

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

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Math 251-L10

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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

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