Mathematical Logic Notes

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Chapter 1

Trigonometric Identities

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1.1 Fundamental Identities

- $x^2 + y^2 = r^2$
- $tan(x) = \frac{sin(x)}{cos(x)}$
- $sin(-x) = -sin(x)$
- $cos(-x) = cos(x)$

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1.2 Pythagorean identities

- $sin^2(x) + cos^2(x) = 1$
- $1 = sec^2(x) - tan^2(x)$
- $1 = csc^2(x) - cot^2(x)$

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1.3 Sum and difference formulas

- $sin(a + b) = sin(a)cos(b) + cos(a) + sin(b)$
- $sin(a - b) = sin(a)cos(b) - cos(a) + sin(b)$
- $cos(a + b) = cos(a)cos(b) - sin(a) + sin(b)$
- $cos(a - b) = cos(a)cos(b) + sin(a) + sin(b)$

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1.4 Double-angle and half-angle formulas

- $sin(2a) = 2sin(a)cos(a)$
- $cos(2a) = cos^2(a) - sin^2(a)$
- $sin(a/2) = \sqrt{(1/2)(1 - cos(a))}$
- $cos(a/2) = \sqrt{(1/2)(1 + cos(a))}$

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1.5 Tangent angle formulas

- $tan(a + b) = \frac{tan(a)+tan(b)}{1-tan(a)tan(b)}$
- $tan(a - b) = \frac{tan(a)-tan(b)}{1+tan(a)tan(b)}$
- $tan(2a) = \frac{2tan(a)}{1-tan^2(a)}$
- $tan(a/2) = \frac{1-cos(a)}{sin(a)}$

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1.6 Products as sums formulas

- $sin(a)cos(b) = (1/2)(sin(a+b) + sin(a-b))$
- $cos(a)sin(b) = (1/2)(sin(a+b) - sin(a-b))$
- $cos(a)cos(b) = (1/2)(cos(a+b) + cos(a-b))$
- $sin(a)sin(b) = (-1/2)(cos(a+b) - cos(a-b))$

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1.7 Sums as products formulas

- $sin(a) + sin(b) = 2sin((1/2)(a+b))cos((1/2)(a-b))$
- $sin(a) - sin(b) = 2sin((1/2)(a-b))cos((1/2)(a+b))$
- $cos(a) + cos(b) = 2cos((1/2)(a+b))cos((1/2)(a-b))$
- $cos(a) - cos(b) = -2sin((1/2)(a+b))sin((1/2)(a-b))$

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