# Proof Catalogue

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# Contents

# Chapter 1

# Pre-Calclulus Results

## 1.1 Sum/Difference of Angles Identities

**Theorem – Sum and Difference Formulas for Sine and Cosine:**
For angles $\alpha$ and $\beta$:

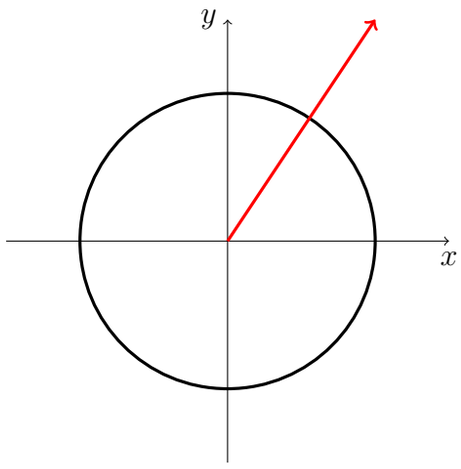
$$\sin(\alpha+\beta)=\sin\alpha\cos\beta+\cos\alpha\sin\beta \qquad \sin(\alpha-\beta)=\sin\alpha\cos\beta-\cos\alpha\sin\beta$$
$$\cos(\alpha+\beta)=\cos\alpha\cos\beta-\sin\alpha\sin\beta \qquad \cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$$

It is standard to prove only one of these results, since the remaining results can be found using co-function identities and changing the sign of angle $\beta$.

We present some proofs of the identity $\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$:

### 1.1.1 Rotation Around the Unit Circle

***Proof of Difference Formula for Cosine*:** Let $\alpha$ and $\beta$ be angles in central position.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