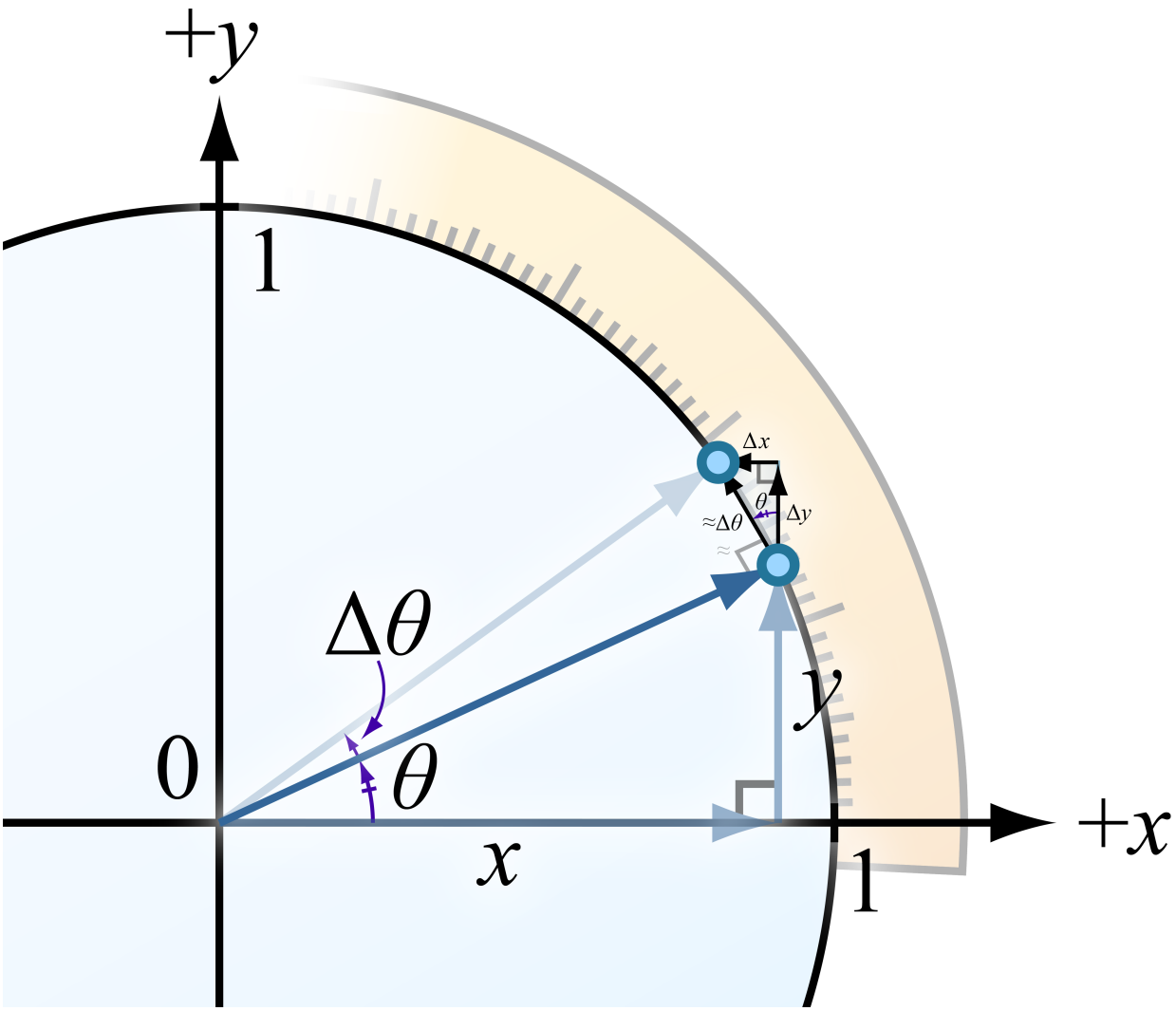
Derivatives of the circle functions



$$x = \cos(\theta)$$

$$y = \sin(\theta)$$

For small $\Delta\theta$,

$$\Delta x \approx -\Delta\theta \sin(\theta)$$

$$\frac{\Delta x}{\Delta\theta} \approx -\sin(\theta)$$

$$\lim_{\Delta\theta \to 0} \frac{\Delta x}{\Delta\theta} = -\sin(\theta)$$

$$\frac{\mathrm{d}}{\mathrm{d}\theta}[\cos(\theta)] = -\sin(\theta)$$

For small $\Delta\theta$,

$$\Delta y \approx +\Delta\theta \cos(\theta)$$

$$\frac{\Delta y}{\Delta\theta} \approx \cos(\theta)$$

$$\lim_{\Delta\theta \to 0} \frac{\Delta y}{\Delta\theta} = \cos(\theta)$$

$$\frac{\mathrm{d}}{\mathrm{d}\theta}[\sin(\theta)] = \cos(\theta)$$