## Formula Sheet

### Common Derivatives

- $\frac{d}{dx} \sin x = \cos x$

- $\frac{d}{dx} \cos x = -\sin x$

- $\frac{d}{dx} \tan x = \sec^2 x$

- $\frac{d}{dx} \cot x = -\csc^2 x$

- $\frac{d}{dx} \sec x = \sec x \tan x$

- $\frac{d}{dx} \csc x = -\csc x \cot x$

- $\frac{d}{dx} a^x = a^x \ln a$

- $\frac{d}{dx} \ln x = \frac{1}{x}$

- $\frac{d}{dx} \arctan x = \frac{1}{1+x^2}$

### Trig identities

- $\sin^2(x) + \cos^2(x) = 1$

- $\tan^2(x) + 1 = \sec^2(x)$

- $\sin^2(x) = \frac{1-\cos(2x)}{2}$

- $\cos^2(x) = \frac{1+\cos(2x)}{2}$

### Trig Ratios

| $\theta$ | $0$ | $\frac{\pi}{6}$ | $\frac{\pi}{4}$ | $\frac{\pi}{3}$ | $\frac{\pi}{2}$ | $\pi$ | $\frac{3\pi}{2}$ |
|---|---|---|---|---|---|---|---|
| $\sin(\theta)$ | $0$ | $\frac{1}{2}$ | $\frac{1}{\sqrt{2}}$ | $\frac{\sqrt{3}}{2}$ | $1$ | $0$ | $-1$ |
| $\cos(\theta)$ | $1$ | $\frac{\sqrt{3}}{2}$ | $\frac{1}{\sqrt{2}}$ | $\frac{1}{2}$ | $0$ | $-1$ | $0$ |