

## A note on exponents of trig functions

When we raise a trigonometric function like sine or cosine to an exponent, we often put the exponent before the argument of the function. For instance:

$$\cos^2(t) = (\cos(t))^2$$

$$\sin^{\frac{1}{2}}(t) = (\sin(t))^{\frac{1}{2}} = \sqrt{\sin(t)}$$

So, for instance, when finding the derivative for something like the above, we use the chain rule, with sin or cos as the inside function, and the exponent as the outside function:

$$\frac{d}{dx} (\cos^2(t)) = 2 \cos(t) \cdot (-\sin(t)) = -2 \cos(t) \sin(t)$$

$$\frac{d}{dx} \left( \sin^{\frac{1}{2}}(t) \right) = \frac{1}{2} \sin^{-\frac{1}{2}}(t) \cdot \cos(t) = \frac{\cos(t)}{2\sqrt{\sin(t)}}$$