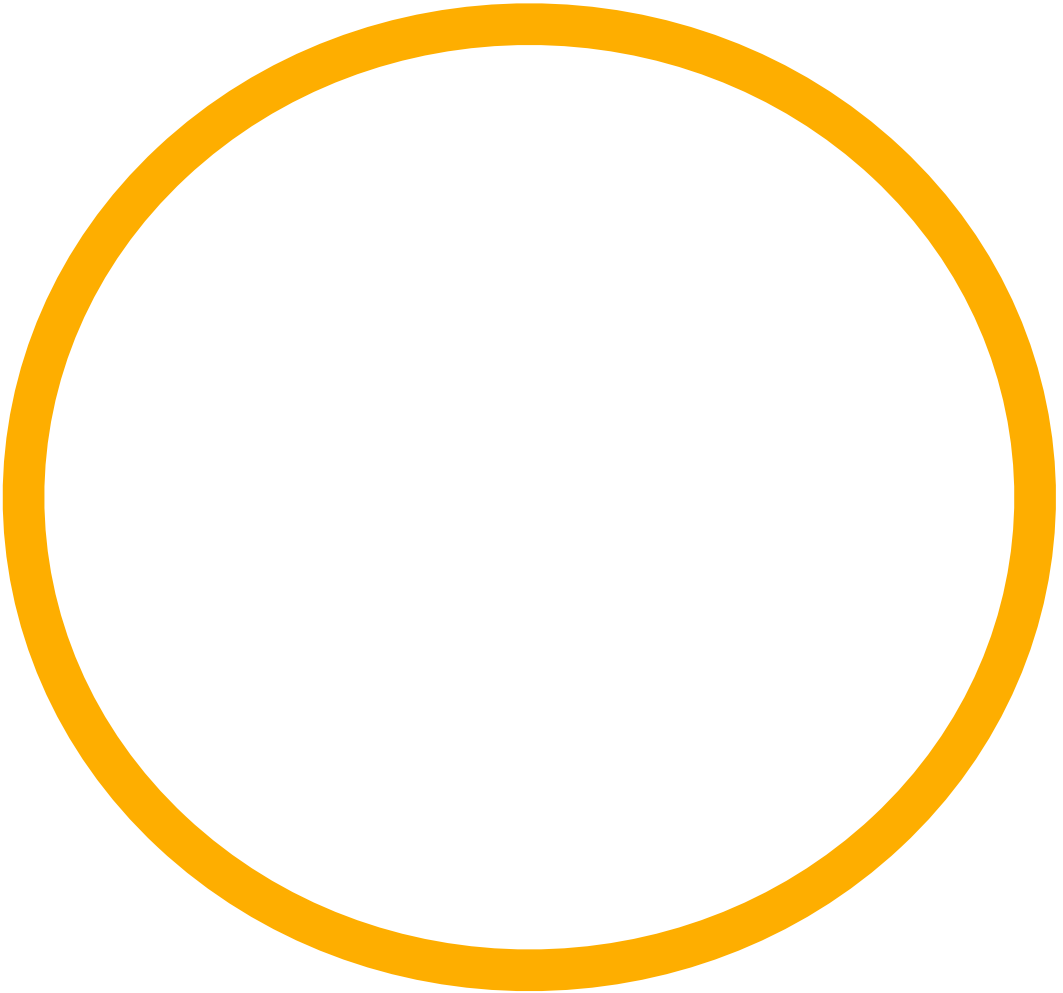
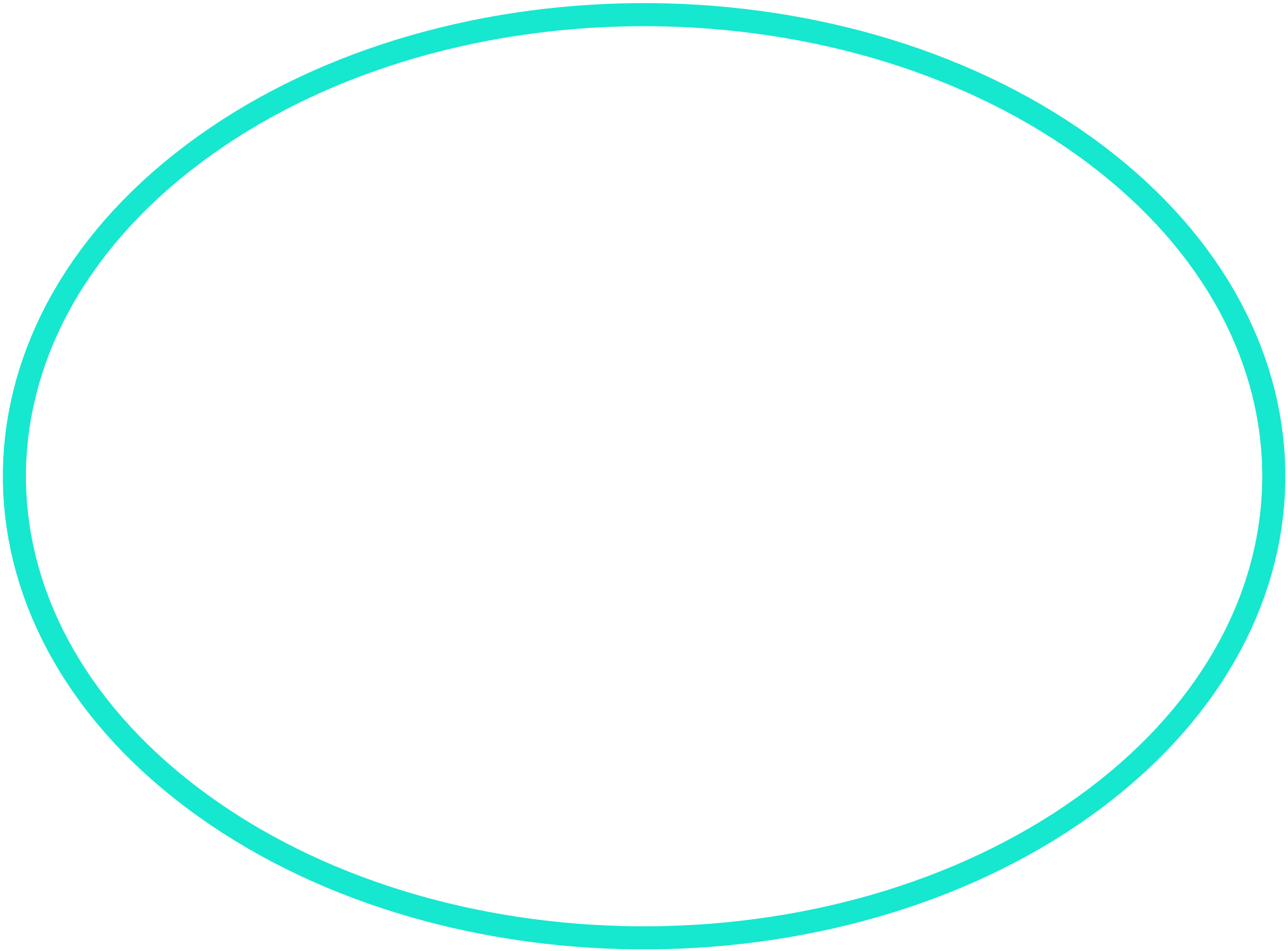
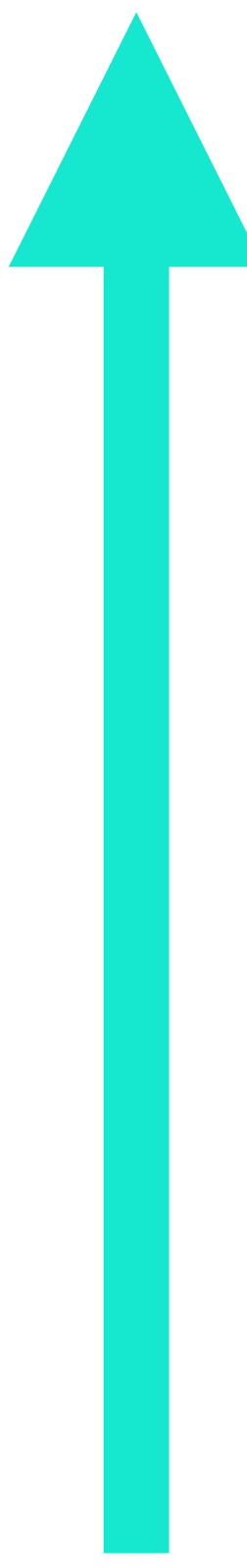
mean value theorem generalized



slope of the tangent line



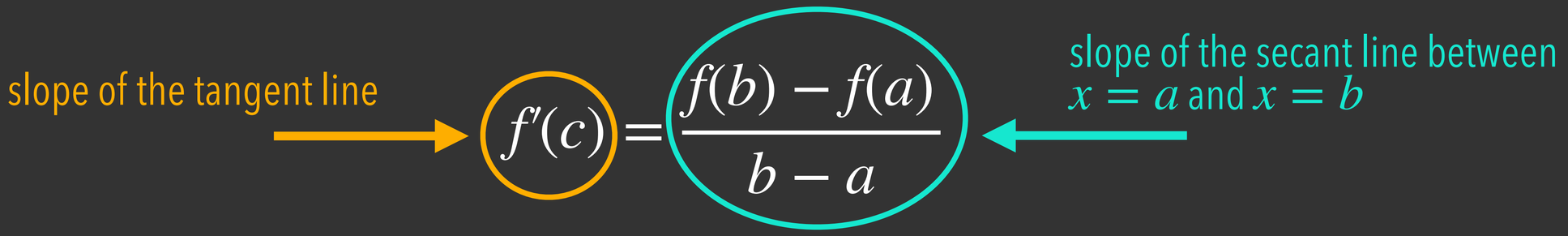


slope of the secant line between $x = a$ and $x = b$

this is the idea behind Taylor's Theorem and using polynomials to approximate a smooth function

mean value theorem generalized

Suppose $f(x)$ is a continuous function on closed interval $[a, b]$ and is differentiable on the interval's interior (a, b) at which a point c exists such that



we can re-write the above equation as

$$f(b) = f(a) + f'(c)(b - a)$$
$$\approx f(a) + f'(a)(b - a)$$

this looks very much like the linear approximation for $f(b)$ using the tangent line at $x = a$

this is the idea behind Taylor's Theorem and using polynomials to approximate a smooth function

Taylor's theorem

Taylor polynomial of degree n