Top 10 Theorems of Calculus

10. The Intermediate Value Theorem	If *f* is continuous on the closed interval [a,b] and d is any value between *f*(a) and *f*(b), then there exists some c in the open interval (a,b) such that *f*(c)=d.
9. The Extreme Value Theorem	If *f* is continuous on the closed interval [a,b], then f has both a maximum and a minimum on the interval.
8. Relative Extrema only occur at critical points	If *f* has a relative minimum or a relative maximum at x = c, then c is a critical number of *f*.
7. The Second Derivative Test for Relative Extrema	Given c is a critical number If $f''(c) < 0$, then $(c, f(c))$ is a relative max If $f''(c) > 0$, then $(c, f(c))$ is a relative min If $f''(c) = 0$, then the test fails.
6. The First Derivative Test for Relative extrema	If c is a critical number of the function f that is continuous on an open interval containing c and differentiable on the open interval (except possibly at c) then $(c, f(c))$ is a relative max if $f'(c)$ changes from positive to negative at c and $(c, f(c))$ is a relative min if $f'(c)$ changes from negative to positive at c
5. Rolle's Theorem	If *f* is continuous on the closed interval [a,b] and differentiable on the open interval (a,b), and $f(a) = f(b)$ then there exists some c in the open interval such that $f'(c) = 0$
4. The Mean Value Theorem (Derivatives)	If *f* is continuous on the closed interval [a,b] and differentiable on the open interval (a,b), then there exists some c in the open interval such that $f'(c) = \frac{f(b) - f(a)}{b - a}$
3. The Mean Value Theorem (Integrals)	If f is continuous on the closed interval [a,b], then there exists a number c in the open interval such that $\int_a^b f(x)dx = f(c)(b-a)$
2. The Second Fundamental Theorem of Calculus	$\frac{d}{dx}\int_a^x f(t)dt = f(x)$
1. The Fundamental Theorem of Calculus	$\int_a^b f'(x)dx = f(b) - f(a)$