Item	**Integral Calculus**	**Summation Calculus**
Definition	$\int_a^b f(x)\,dx =$ limit of Riemann sums	$\sum_{a\le x<b} f(x) =$ the sum of all $f(x)$ values for **integer** x satisfying $a \le x < b$
Antiderivative Antidifference	$D^{-1}f(x) = \int f(x)\,dx = F(x) =$ any function $F(x)$ s.t. $F'(x) = f(x)$.	$\Delta^{-1}f(x) = \sum f(x)\,\delta x = F(x) =$ any function $F(x)$ s.t.$\Delta F(x) = f(x)$.
Notation	$F(x)\Big\vert_a^b = F(b) - F(a)$	$\Big[F(x)\Big]_a^b = F(b) - F(a)$
Rules		
Sum/ Difference	$\int_a^b [f(x) \pm g(x)]\,dx =$ $\int_a^b f(x)\,dx \pm \int_a^b g(x)\,dx$	$\sum_{a\le x<b} [f(x) \pm g(x)] =$ $\sum_{a\le x<b} f(x) \pm \sum_{a\le x<b} g(x)$
Constant multiple ($c =$ constant)	$\int_a^b cf(x)\,dx = c\int_a^b f(x)\,dx$	$\sum_{a\le x<b} c\cdot f(x) = c\sum_{a\le x<b} f(x)$
Substitution	$\int_a^b f(u(x))u'(x)\,dx =$ $\int_{u(a)}^{u(b)} f(u)\,du = F(u)\Big\vert_{u(a)}^{u(b)}$	
Integration/ Summation by parts	$\int_a^b u(x)v'(x)\,dx =$ $u(x)v(x)\Big\vert_a^b - \int_a^b v(x)u'(x)\,dx$	
Fundamental **Theorem**	If $F'(x) = f(x)$ is continuous, then $\int_a^b f(x)\,dx = F(x)\Big\vert_a^b$.	If $\Delta F(x) = f(x)$, then $\sum_{a\le x<b} f(x) = F(x)\Big\vert_a^b$.
Functions	**Antiderivatives**	**Antidifferences**
Ordinary/falling Powers $n \neq 1$	$D^{-1}x^n = \dfrac{x^{n+1}}{n+1}$	$\Delta^{-1}x^{\underline{n}} =$
$n = -1$ power	$D^{-1}x^{-1} = \ln(x)$	$\Delta^{-1}x^{\underline{-1}} =$
Exponential $r > 0, r \neq 1$	$D^{-1}r^x = \dfrac{r^x}{\ln(r)}$	$\Delta^{-1}r^x =$
Logarithm/ Harmonic sequence	$D^{-1}\ln(x) =$	$\Delta^{-1}H_x =$