Writing Definite Integrals as Riemann Sums

$$\int_a^b f(x)\,dx \Leftrightarrow \lim_{n\to\infty}\sum_{k=1}^{n} f\left(a+k\left(\frac{b-a}{n}\right)\right)\cdot\frac{b-a}{n}$$

$$\Leftrightarrow \lim_{n\to\infty}\sum_{k=1}^{n} f\left(a+k(\Delta x)\right)\cdot\Delta x$$

Integral	$\Delta x=\frac{b-a}{n}$	$x\to a+k\cdot\Delta x$	Summation Notation
$\int_3^5 \boxed{\frac{1}{2+x}}dx$	$\frac{5-3}{n}=\frac{2}{n}$	$x\to\begin{cases}3+k\left(\frac{2}{n}\right)\\ 3+\frac{2k}{n}\end{cases}$	$\lim_{n\to\infty}\sum_{k=1}^{n}\boxed{\frac{1}{2+\left(3+\frac{2k}{n}\right)}}\cdot\frac{2}{n}=\frac{2}{n}\left[\frac{1}{5+\frac{2}{n}}+\frac{1}{5+\frac{4}{n}}+\cdots+\frac{1}{5+\frac{2n}{n}}\right]$
$\int_1^2 \sin(3x)\,dx$			
$\int_0^5 \frac{1}{1+x^2}\,dx$			
$\int_1^3 \sqrt{x+7}+2dx$			

Integral	$\Delta x = \dfrac{b-a}{n}$	$x \to a + k \cdot \Delta x$	Summation Notation
$\int_1^2 \sin(3x)\,dx$	$\Delta x = \dfrac{2-1}{n} = \dfrac{1}{n}$	$x \to \begin{cases} 1 + k\left(\dfrac{1}{n}\right) \\ 1 + \dfrac{k}{n} \end{cases}$	$\lim_{n\to\infty} \sum_{k=1}^{n} \sin\left(3+\dfrac{3k}{n}\right)\cdot\dfrac{1}{n} = \dfrac{1}{n}\left[\left(3+\dfrac{3}{n}\right)+\left(3+\dfrac{6}{n}\right)+\cdots+\left(3+\dfrac{3n}{n}\right)\right]$
$\int_0^5 \dfrac{1}{1+x^2}\,dx$	$\Delta x = \dfrac{5-0}{n} = \dfrac{5}{n}$	$x \to \begin{cases} 0 + k\left(\dfrac{5}{n}\right) \\ \dfrac{5k}{n} \end{cases}$	$\lim_{n\to\infty} \sum_{k=1}^{n} \dfrac{1}{1+\left(\dfrac{5k}{n}\right)^2}\cdot\dfrac{5}{n} = \lim_{n\to\infty} \dfrac{5}{n}\left[\dfrac{1}{1+\dfrac{25}{n^2}}+\dfrac{1}{1+\dfrac{100}{n^2}}+\cdots+\dfrac{1}{1+\dfrac{25n^2}{n}}\right]$
$\int_1^3 \sqrt{x+7}+2dx$	$\Delta x = \dfrac{3-1}{n} = \dfrac{2}{n}$	$x \to \begin{cases} 1 + k\left(\dfrac{2}{n}\right) \\ 1 + \dfrac{2k}{n} \end{cases}$	$\lim_{n\to\infty} \sum_{k=1}^{n} \left(\sqrt{\left(1+\dfrac{2k}{n}\right)+7}+2\right)\cdot\dfrac{2}{n} = \lim_{n\to\infty} \sum_{k=1}^{n} \left(\sqrt{\left(8+\dfrac{2k}{n}\right)}+2\right)\cdot\dfrac{2}{n}$ $= \lim_{n\to\infty}\left[\left(\sqrt{8+\dfrac{2}{n}}+2\right)+\left(\sqrt{8+\dfrac{4}{n}}+2\right)+\cdots+\left(\sqrt{8+\dfrac{n}{n}}+2\right)\right]$