Part II. Use the process outlined in Part I to find a limit expression for the area of each region bounded by the givenfunction and the x-axis on [a, b].

Function, [a, b] **Limit expression of the Riemann sum**

1. $f(x) = 3x$ on [0. 2] $\Delta x = \frac{2}{n}$, $x_i = 0 + \frac{2i}{n}$, $\lim_{n\to\infty} \sum_{i=1}^{n} 3\left(\frac{2i}{n}\right)\frac{2}{n}$ ①

2. $f(x) = x^2$ on [0, 3] $\Delta x = \frac{3}{n}$, $x_i = 0 + \frac{3i}{n}$ $\lim_{n\to\infty} \sum_{i=1}^{n} \left(\frac{3i}{n}\right)^2 \frac{3}{n}$ ②

3. $f(x) = 2x^2$ on [1, 3] $\Delta x = \frac{3-1}{n}$, $x_i = 1 + \frac{2i}{n}$ $\lim_{n\to\infty} \sum_{i=1}^{n} 2\left(1 + \frac{2i}{n}\right)^2 \frac{2}{n}$ ③

4. $f(x) = 1 - x^2$ on [-1, 1] $\Delta x = \frac{1--1}{n}$, $x_i = -1 + \frac{2i}{n}$ $\lim_{n\to\infty} \sum_{i=1}^{n} \left[1 - \left(\frac{2i}{n} - 1\right)^2\right]\frac{2}{n}$ ④

5. $f(x) = 2x - x^3$ on [0, 1] $\Delta x = \frac{1-0}{n}$ $x_i = 0 + \frac{i}{n}$ $\lim_{n\to\infty} \sum_{i=1}^{n} \left[2\left(\frac{i}{n}\right) - \left(\frac{i}{n}\right)^3\right]\frac{1}{n}$ ⑤

6. $\int_1^3 (2x+1)dx$ $\Delta x = \frac{3-1}{n}$, $x_i = 1 + \frac{2i}{n}$ $\lim_{n\to\infty} \sum_{i=1}^{n} \left[2\left(1 + \frac{2i}{n}\right) + 1\right]\frac{2}{n}$ ⑥

7. $\int_2^4 (3x^2 - 1)dx$ $\Delta x = \frac{4-2}{n}$ $x_i = 2 + \frac{2i}{n}$ $\lim_{n\to\infty} \sum_{i=1}^{n} \left[3\left(2 + \frac{2i}{n}\right)^2 - 1\right]\frac{2}{n}$ ⑦

8. $\int_{-2}^{0} (x+3)^2 dx$ $\Delta x = \frac{0--2}{n}$ $x_i = -2 + \frac{2i}{n}$ $\lim_{n\to\infty} \sum_{i=1}^{n} \left[\left(\frac{2i}{n} - 2\right) + 3\right]^2 \frac{2}{n}$ ⑧

9. $\int_0^{\pi} \sin x \, dx$ $\Delta x = \frac{\pi - 0}{n}$ $x_i = 0 + \frac{\pi i}{n}$ $\lim_{n\to\infty} \sum_{i=1}^{n} \sin\left(\frac{\pi i}{n}\right)\frac{\pi}{n}$ ⑨

Part III. In each of the following problems, translate the Riemann sum into a definite integral.

[redacted]

1. $\lim_{n\to\infty} \sum_{i=1}^{n} \left[3\left(\frac{3i}{n} + \overset{a}{2}\right) - 8\right]\overset{\Delta x}{\left(\frac{3}{n}\right)}$ $\int_2^5 (3x - 8)\,dx$

$b - 2 = 3$
$b = 5$

2. $\lim_{n\to\infty} \sum_{i=1}^{n} \left[5\left(\frac{5i}{n} - \overset{a}{2}\right)^3 - 1\right]\left(\frac{5}{n}\right)$ $\int_{-2}^{3} (5x^3 - 1)\,dx$

$b - {}^-2 = 5$
$b = 3$

3. $\lim_{n\to\infty} \sum_{i=1}^{n} \left[3\left(\frac{2i}{n} - \overset{a}{2}\right) + 4\right]\left(\frac{2}{n}\right)$ $\int_{-2}^{0} (3x + 4)\,dx$

$b - {}^-2 = 2$
$b = 0$

4. $\lim_{n\to\infty} \sum_{i=1}^{n} \left[\cos\left(\frac{i\pi}{6n}\right)\right]\left(\frac{\pi}{6n}\right)$ $\int_0^{\pi/4} (\cos x)\,dx$

$b - 0 = \pi$