Definite Integral ↔ Limit of a Riemann Sum

Concept: $\int_a^b f(x)\,dx = \lim_{n\to\infty}\sum_{k=1}^{n}\left(f(a+k\Delta x)\Delta x\right) = \lim_{n\to\infty}\sum_{k=1}^{n}\left(\underbrace{f\left(a+k\,\frac{b-a}{n}\right)}_{\text{right-hand heights}}\overbrace{\frac{b-a}{n}}^{\text{width}}\right)$

where n is the number of subdivisions.

Example: $\int_1^4 x^5\,dx = \lim_{n\to\infty}\sum_{k=1}^{n}\left(\left(1+k\bullet\frac{3}{n}\right)^5\frac{3}{n}\right)$

Write each Riemann Sum as a definite integral and each definite integral as a right Riemann Sum.
Do not evaluate.

1. $\lim_{n\to\infty}\sum_{k=1}^{n}\left(f\left(2+k\bullet\frac{3}{n}\right)\frac{3}{n}\right)$

2. $\int_1^5 f(x)\,dx$

3. $\int_2^4 \sin x\,dx$

4. $\lim_{n\to\infty}\sum_{k=1}^{n}\left(\cos\left(0+\frac{k\pi}{n}\right)\frac{\pi}{n}\right)$

5. $\lim_{n\to\infty}\sum_{k=1}^{n}\left(\sqrt{3+\frac{2k}{n}}\bullet\frac{2}{n}\right)$

6. $\int_4^5 (x+1)^2\,dx$

7. $\int_0^5 \left(x^2+1\right)dx$

8. $\lim_{n\to\infty}\sum_{k=1}^{n}\left(\left(3\left(\frac{k}{n}+4\right)+2\right)\frac{1}{n}\right)$

9. $\int_2^7 \left(2x^2+5x\right)dx$

10. $\lim_{n\to\infty}\sum_{k=1}^{n}\left(\left(\cos\left(\frac{k\pi}{3n}\right)\right)\frac{\pi}{3n}\right)$

Solutions:

1. $\int_2^5 f\left(x\right)dx$

2. $\lim_{n\to\infty}\sum_{k=1}^{n}\left(f\left(1+k\bullet\frac{4}{n}\right)\frac{4}{n}\right)$

3. $\lim_{n\to\infty}\sum_{k=1}^{n}\left(\sin\left(2+\frac{2k}{n}\right)\frac{2}{n}\right)$

4. $\int_0^{\pi}\cos x\,dx$

5. $\int_3^5\sqrt{x}\,dx$

6. $\lim_{n\to\infty}\sum_{k=1}^{n}\left(\left(4+\frac{k}{n}+1\right)^2\frac{1}{n}\right)$

7. $\lim_{n\to\infty}\sum_{k=1}^{n}\left(\left(\left(\frac{5k}{n}\right)^2+1\right)\frac{5}{n}\right)$

8. $\int_4^5\left(3x+2\right)dx$

9. $\lim_{n\to\infty}\sum_{k=1}^{n}\left(\left(2\left(2+\frac{5k}{n}\right)^2+5\left(2+\frac{5k}{n}\right)\right)\frac{5}{n}\right)$

10. $\int_0^{\frac{\pi}{3}}\cos x\,dx$