1. Which of the following definite integrals are equal to $\lim_{n\to\infty}\sum_{k=1}^{n}\sin\left(-1+\frac{5k}{n}\right)\frac{5}{n}$?

shifted left 1
adds 1

I. $\int_{-1}^{4}\sin x\,dx$

II. $\int_{0}^{5}\sin(-1+x)\,dx$ most obvious

III. $5\int_{0}^{1}\sin(-1+5x)\,dx$ 5 times the interval

$\Delta x = \frac{5}{n}$

(A) I only

(B) II only

(C) III only

(D) I, II, and III

5. Which of the following definite integrals is equal to $\lim_{n\to\infty}\sum_{k=1}^{n}\frac{12k}{n}\cos\left(1+\frac{4k}{n}\right)\frac{4}{n}$?

(A) $\int_1^5 12\cos x\,dx$ ✗

(B) $\int_1^5 3x\cos x\,dx$ ✗

(C) $\int_0^4 12\cos(1+x)\,dx$ ✗

(D) $\int_0^4 3x\cos(1+x)\,dx$ ✓

interval of 4

$\frac{12k}{4} = 3k$

$\Delta x = \frac{4}{n}$

$1+\frac{4k}{n}$

$1+k\Delta x$

6. Which of the following is a left Riemann sum approximation of $\int_1^7 (4\ln x + 2)\,dx$ with n subintervals of equal length?

(A) $\sum_{k=1}^{n} \left(4\ln\left(1+\frac{k-1}{n}\right)+2\right)\frac{1}{n}$ ✗

(B) $\sum_{k=1}^{n} \left(4\ln\left(\frac{6k}{n}\right)+2\right)\frac{6}{n}$ ✗

(C) $\sum_{k=1}^{n} \left(4\ln\left(1+\frac{6(k-1)}{n}\right)+2\right)\frac{6}{n}$ ✓

(D) $\sum_{k=1}^{n} \left(4\ln\left(1+\frac{6k}{n}\right)+2\right)\frac{6}{n}$ ✗

$\frac{7-1}{n} = \frac{6}{n}$

- height $(4\ln x + 2)$
- left endpoints are x-values at $1+(k-1)$ for k 1-n