Exercises 9-11:

A definite integral $\int_a^b f(x)\,dx$ is defined by the Riemann Sum limit.

(a) Identify $f(x)$, a, and b for the definite integral.

(b) Write summation notation that will approximate the limit using 100 rectangles. Evaluate the approximation by writing and executing an associated TI-84 statement.

(c) Use summation properties and summation formulas to evaluate this limit exactly. Show all significant steps.

9. $\displaystyle\lim_{n\to\infty}\sum_{i=1}^{n}\left[3\left(-1+\frac{6i}{n}\right)+10\right]\left(\frac{6}{n}\right)$

10. $\displaystyle\lim_{n\to\infty}\sum_{i=1}^{n}\left[4-\left(2+\frac{5i}{n}\right)^2\right]\left(\frac{5}{n}\right)$

11. $\displaystyle\lim_{n\to\infty}\sum_{i=1}^{n}\left[2\left(\frac{4i}{n}\right)^3+1\right]\left(\frac{4}{n}\right)$

12. Consider the Riemann Sum Limit:

$$\lim_{n\to\infty}\sum_{i=1}^{n}\left[\sqrt{\left(-1+\frac{3i}{n}\right)^2+4}\right]\left(\frac{3}{n}\right)$$

(a) Identify the definite integral that is defined by this Riemann Sum limit.

(b) Explain briefly why you cannot actually evaluate this limit exactly as you did in Exercises 9-11.

7) $\lim_{n \to \infty} \sum_{i=1}^{n} \left[2 - 3\left(5 + \frac{4i}{n}\right)\right]\left(\frac{4}{n}\right)$ width $= \frac{4}{n}$

a. $\int_{5}^{9} (2 - 3x)\,dx$

9) $\lim_{n \to \infty} \sum_{i=1}^{n} \left[3\left(-1 + \frac{6i}{n}\right) + 10\right]\left(\frac{6}{n}\right)$ width $= \frac{6}{n}$

$\int_{-1}^{5} (3x + 10)\,dx$

10) $\lim_{n \to \infty} \sum_{i=1}^{n} \left[4 - \left(2 + \frac{5i}{n}\right)^2\right]\left(\frac{5}{n}\right)$ width $= \frac{5}{n}$

a. $\int_{2}^{7} (4 - x^2)\,dx$

b. $\sum_{i=1}^{100} \left[4 - \left(2 + \frac{5}{100}\right)^2\right]\left(\frac{5}{100}\right)$

c. $\frac{5}{n} \sum_{i=1}^{n} \left[4 - \left(4 + \frac{20}{n}i + \frac{25}{n^2}i^2\right)\right]$

$\frac{5}{n} \sum_{i=1}^{n} \left(\cancel{4} - \cancel{4} - \frac{20i}{n} - \frac{25}{n^2}i^2\right)$