Calculus

Instructions Please write your name in the upper right-hand corner of the page. Write complete sentences to explain your solutions.

1. Suppose $f(x) = 4\cos x$. Show that the Riemann sum for the function f on the interval $[0, \pi/2]$ using left-hand endpoints for the partition $\{0, \pi/6, \pi/4, \pi/3, \pi/2\}$ is equal to $\pi(6 + \sqrt{3} + \sqrt{2})/6$.
   [This is exercise 8 on page 377 of the textbook.]

2. Express $\lim_{n\to\infty} \sum_{i=1}^{n} \frac{2}{n} \sin\left(\frac{4i^2}{n^2}\right)$ as a definite integral.

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3. Let $p_1 = 2$, $p_2 = 3$, $p_3 = 5$, and in general let p_n be the nth prime number. What is the smallest value of k for which $\displaystyle\sum_{i=1}^{k} \frac{1}{p_i} > 1$?

4. The figure shows the graph of a function f. Estimate the value of $\int_0^4 f(x)\,dx$ by using a regular partition with four subintervals and choosing right-hand endpoints.