1. Speedometer readings for a motorcycle at 12-second intervals are given in the table.

t (s)	0	12	24	36	48	60
v (ft/s)	30	28	25	22	24	27

   (a) Estimate the distance traveled by the motorcycle during this time period using the velocities at the beginning of the time intervals.

   (b) Give another estimate using the velocities at the end of the time periods.

   (c) Are your estimates in parts (a) and (b) upper and lower estimates? Explain.

Use the following definition for area to answer Problems 2 and 3:
Definition: *The* ***area*** *A of the region S that lies under the graph of the continuous function f is the limit of the sum of the areas of approximating rectangles:*

$$A = \lim_{n\to\infty} R_n = \lim_{n\to\infty} [f(x_1)\Delta x + f(x_2)\Delta x + \cdots + f(x_n)\Delta x]$$

2. Use the definition of area given above to find an expression for the area under the graph of f as a limit. Do not evaluate the limit.

$$f(x) = x^2 + \sqrt{1+2x},\ 4 \le x \le 7$$

3. (a) Use the definition of area given above to find an expression for the area under the curve $y = x^3$ from 0 to 1 as a limit.

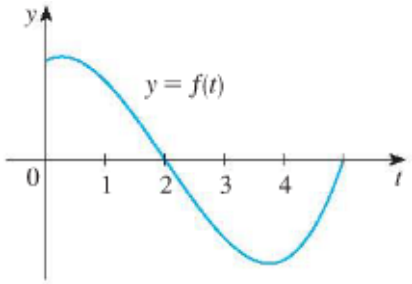
   (b) The following formula for the sum of the cubes of the first n integers is proved in Appendix F of your textbook. Use it to evaluate the limit in part (a).

$$1^3 + 2^3 + 3^3 + \cdots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$$

4. If $\int_1^5 f(x)\,dx = 12$ and $\int_4^5 f(x)\,dx = 3.6$, find $\int_1^4 f(x)\,dx$

5. If $F(x) = \int_2^x f(t)\,dt$, where f is the function whose graph is given, which of the following values is the largest? Explain your reasoning.

   (a) $F(0)$
   (b) $F(1)$
   (c) $F(2)$
   (d) $F(3)$
   (e) $F(4)$



6. Each of the regions A, B, and C bounded by the graph of f and the x-axis has area 3. Find the value of

$$\int_{-4}^{2} [f(x) + 2x + 5]\,dx$$