1. A partition P of the set $[-2, 5]$ has domain $\{0, 1, 2, 3\}$ and $P = (-2, -1, 2, 5)$. Determine the mesh of P.

2. Identify a midpoint tagging τ of this partition P of $[-2, 5]$ that has three intervals and $P = (-2, -1, 2, 5)$.

3. Calculate the area of each region R formed by bounding the following.

a) $y = 6$, $x = 2$, $x = 10$ and the x-axis

b) $y = x - 2$, $x = 0$, $x = 5$ and the x-axis

c) $y = \sqrt{16 - x^2}$, $x = 0$, $x = 4$ and the x-axis

d) $y = 25\sqrt{16 - x^2}$, on $[0, 4]$ and the x-axis.

4. Take R to be the region formed by bounding $y = 4x^2 + 1$, x-axis, $x = 2$, and $x = 4$. Approximate R by using six left-endpoint rectangles, six right-endpoint rectangles, and six midpoint rectangles.

5. Take f to be the function given by $f(x) = 4x^2 + 1$ and the interval I to be the interval $I = [-2, 5]$. Determine an even partition P of I with five intervals and a left tagging τ for P and calculate the quantity $\mathcal{R}(f, P, \tau)$.

6. Calculate using Riemann sums the area of the region R formed by bounding $y = 4x^2 + 1$, $x = 2$, $x = 4$, and the x-axis.

7. Calculate the following by interpreting the definite integral as signed area.

a) $\displaystyle\int_1^3 7\,\mathrm{d}x$

b) $\displaystyle\int_0^4 \sqrt{16-x^2}\,\mathrm{d}x$

c) $\displaystyle\int_2^4 (4x^2+1)\,\mathrm{d}x$

8. Take f and g to be integrable functions with

$$\int_2^5 f(x)\,\mathrm{d}x = -2 \quad \text{and} \quad \int_2^5 g(x)\,\mathrm{d}x = 6.$$

Calculate the following:

$$\int_2^5 (2f(x) + g(x) + 4)\,\mathrm{d}x.$$

9. Take f to be an integrable function with

$$2 \leq f(x) \leq 7$$

on the interval $[-2, 5]$. Calculate an upper and lower bound for the following:

a) $\int_0^3 f(x)\,\mathrm{d}x$

b) $\int_{-2}^5 f(x)\,\mathrm{d}x$

c) $\int_{-2}^5 2f(x)\,\mathrm{d}x$

d) $\int_{-2}^5 (f(x) + 3)\,\mathrm{d}x$

10. Calculate the following:

a) $\int_{-2}^{3} x^4 \, dx$

b) $\int_{-2}^{3} x^{\frac{1}{3}} \, dx$