Riemann Sum Extra Practice

We want to write the following areas as limits of Riemann Sums. For each of the following consider $y = f(x)$ on the interval $[a, b]$

1. $f(x) = x^2$ on $[0, 4]$

2. $f(x) = \sqrt{x}$ on $[1, 3]$

3. $f(x) = e^{-x}$ on $[-1, 4]$

4. $f(x) = \frac{4}{(x+1)^2}$ on $[2, 9]$

5. $f(x) = \ln(x^3 + 9)$ on $[-2, 1]$

6. $f(x)$ on $[a, b]$

Solutions:

1. $$\lim_{n\to\infty} \sum_{k=1}^{n} \left(\frac{4k}{n}\right)^2 \cdot \frac{4}{n}$$

2. $$\lim_{n\to\infty} \sum_{k=1}^{n} \frac{2}{n} \cdot \sqrt{1 + \frac{2k}{n}}$$

3. $$\lim_{n\to\infty} \sum_{k=1}^{n} \frac{5}{n} \cdot e^{-\left(-1+\frac{5k}{n}\right)}$$

4. $$\lim_{n\to\infty} \sum_{k=1}^{n} \frac{7}{n} \cdot \frac{4}{\left(3 + \frac{7k}{n}\right)^2}$$

5. $$\lim_{n\to\infty} \sum_{k=1}^{n} \frac{3}{n} \cdot \ln\left(\left(-2 + \frac{3k}{n}\right)^3 + 9\right)$$

6. $$\lim_{n\to\infty} \sum_{k=1}^{n} f\left(a + \frac{(b-a)k}{n}\right) \cdot \frac{(b-a)}{n}$$