1. Let $f(x) = x^2 - 3x$

   (a) Find R_6 on the interval [2,5]. Sketch the graph of $f(x)$ and the corresponding rectangles.

   (b) Write the expression for R_n

   (c) Write $\displaystyle\int_2^5 f(x)\, dx$ as the limit of a Riemann sum.

2. Let $f(x) = \begin{cases} \sqrt{4 - x^2} & 0 < x < 2 \\ -x + 2 & x \geq 2 \end{cases}$

   (a) Sketch the graph of $f(x)$.

   (b) Use the graph to evaluate $\displaystyle\int_0^2 f(x)\, dx$ and $\displaystyle\int_0^3 f(x)\, dx$

3. Evaluate the following definite integrals:

   (a) $\displaystyle\int_1^4 \left(x^3 - \frac{2}{x}\right) dx$ *Ans:* $\frac{255}{4} - 4\ln(2)$

   (b) $\displaystyle\int_1^4 (3 + x\sqrt{x})\, dx$ *Ans:* $\frac{107}{5}$

   (c) $\displaystyle\int_{\frac{1}{2}}^{\frac{\sqrt{3}}{2}} \frac{6}{\sqrt{1 - t^2}}\, dt$ *Ans:* π

   (d) $\displaystyle\int_{-1}^0 \frac{1}{1 - 4x}\, dx$ *Ans:* $\frac{\ln(5)}{4}$

   (e) $\displaystyle\int_0^1 xe^{-x^2}\, dx$ *Ans:* $\frac{e-1}{2e}$

   (f) $\displaystyle\int_0^{\frac{\pi}{2}} \cos x \sin(\sin x)\, dx$ *Ans:* $1 - \cos(1)$

   (g) $\displaystyle\int_0^1 x\sqrt{1 - x}\, dx$ (Set $u = 1 - x$.)   *Ans:* $\frac{4}{15}$

   (h) $\displaystyle\int_0^3 |x^2 - 4|\, dx$ (Start by sketching the graph of $f(x) = |x^2 - 4|$.)   *Ans:* $\frac{23}{3}$