Reading Stewart §3.9, 4.1, 4.2.

1. Compute the following antiderivatives (later, these will also be called "indefinite integrals.").

   (a) $\int u^3 - 5u^2 + \pi \, du$

   (b) $\int 5 + 4 \sec\theta \tan\theta \, d\theta$

   (c) $\int \sqrt[4]{x^5} + \sqrt[5]{x^4} \, dx$

   (d) $\int \frac{3}{x^3} + \frac{5}{x^4} - \frac{2}{x^5} \, dx$

2. Solve the following initial value problem. Your answer should be a function $f(x)$.

$$\begin{aligned} f'(x) &= 24x^2 + 6x - 4 \\ f(1) &= 11 \end{aligned}$$

3. Find the function $f(x)$ such that

$$f''(x) = x^2 - 2x + 3,$$

   with $f'(1) = 2$ and $f(1) = -3$.

   Hint You can think of this as two initial value problems in a row.

4. Let $f(x) = \frac{6}{x}$.

   (a) Estimate the area under the graph of $y = f(x)$ from $x = 1$ to $x = 3$ using four equal-width subintervals, and rectangles of height determined by the right endpoints. (That is, compute the (right-endpoint) Riemann sum R_4.)

   (b) Sketch the graph of this region (under $y = f(x)$ from $x = 1$ to $x = 3$) along with the four rectangles. Based on your sketch, is your estimate in part (a) larger or smaller than the actual area under the graph?

5. Let $f(x) = \sqrt{x+1}$, and consider the interval $[3, 8]$.

   (a) If we chop $[3, 8]$ into n equal subintervals, what is the length Δx of each subinterval, and what is the right-hand endpoint x_i of the i-th interval?

   (b) Write down the Riemann sum $R_n = \sum_{i=1}^{n} f(x_i)\Delta x$ for the function $f(x) = \sqrt{x+1}$ on the interval $[3, 8]$, using the values of the expressions you found in part (a). **Do not simplify the sum**.