

**Exercise 30**

Evaluate the integral.

$$\int_{-1}^2 (3u - 2)(u + 1) du$$

---

**Solution**

According to part 2 of the fundamental theorem of calculus,

$$\int_a^b f(x) dx = F(b) - F(a),$$

where  $F$  is an antiderivative of  $f$ . Use the power rule in reverse here: Bump up the exponent by 1 and divide by that exponent.

$$\begin{aligned} \int_{-1}^2 (3u - 2)(u + 1) du &= \int_{-1}^2 (3u^2 + u - 2) du \\ &= \int_{-1}^2 3u^2 du + \int_{-1}^2 u du - \int_{-1}^2 2 du \\ &= \left(\frac{3u^3}{3}\right)\Big|_{-1}^2 + \left(\frac{u^2}{2}\right)\Big|_{-1}^2 - (2u)\Big|_{-1}^2 \\ &= (u^3)\Big|_{-1}^2 + \frac{1}{2}(u^2)\Big|_{-1}^2 - 2(u)\Big|_{-1}^2 \\ &= [2^3 - (-1)^3] + \frac{1}{2}[2^2 - (-1)^2] - 2[2 - (-1)] \\ &= 9 + \frac{1}{2}(3) - 2(3) \\ &= \frac{9}{2} \end{aligned}$$