

Evaluate the integral.<sup>1</sup>

$$\int_1^2 \left( \frac{1}{x^2} - \frac{4}{x^3} \right) dx$$

$$\begin{aligned} \int_1^2 \left( \frac{1}{x^2} - \frac{4}{x^3} \right) dx &= \int_1^2 x^{-2} - 4 \cdot x^{-3} dx \\ &= \left[ \frac{x^{-2+1}}{-2+1} - 4 \cdot \frac{x^{-3+1}}{-3+1} \right]_1^2 \\ &= \left[ \frac{x^{-1}}{-1} - 4 \cdot \frac{x^{-2}}{-2} \right]_1^2 \\ &= \left[ -\frac{1}{x} - 4 \cdot -2 \frac{1}{x^2} \right]_1^2 \\ &= \left[ -\frac{1}{x} + 2 \cdot \frac{1}{x^2} \right]_1^2 \\ &= \left( -\frac{1}{2} + 2 \cdot \frac{1}{2^2} \right) - \left( -\frac{1}{1} + 2 \cdot \frac{1}{1^2} \right) \\ &= \left( -\frac{1}{2} + 2 \cdot \frac{1}{4} \right) - (-1 + 2 \cdot 1) \\ &= \left( -\frac{1}{2} + \frac{1}{2} \right) - 1 \\ &= -1 \end{aligned}$$

Thus,

$$\int_1^2 \left( \frac{1}{x^2} - \frac{4}{x^3} \right) dx = -1$$

---

<sup>1</sup>Stewart, *Calculus, Early Transcendentals*, p. 409, #28.