

Exercício 1 [10.0015]

$$\begin{aligned} 1) I_1 &= \int_1^2 \left(x^2 + \frac{3}{x^2} \right) dx \\ &= \left[\frac{x^3}{3} + 3 \cdot \left(-\frac{1}{x} \right) \right]_1^2 \\ &= \frac{8}{3} + 3 \cdot \left(\frac{1}{2} \right) - \left(\frac{1}{3} + 3 \cdot \left(-\frac{1}{1} \right) \right) \\ &= \frac{23}{6} \end{aligned}$$

$$\begin{aligned} 2) I_2 &= \int_1^2 (2 - 4e^{3x}) dx \\ &= \left[2x - \frac{4}{3} e^{3x} \right]_1^2 \\ &= 4 - \frac{4}{3} e^6 - \left(2 - \frac{4}{3} e^3 \right) \\ &= 2 - \frac{4}{3} e^3 (e^3 - 1) \end{aligned}$$

$$\begin{aligned} 3) I_3 &= \int_0^1 \frac{x+1}{x^2+2x+5} dx \\ &= \left[\frac{1}{2} \ln(x^2+2x+5) \right]_0^1 \\ &= \frac{1}{2} \ln(8) - \frac{1}{2} \ln(5) \\ &= \frac{1}{2} \ln\left(\frac{8}{5}\right) \end{aligned}$$

$$\begin{aligned} 4) I_4 &= \int_1^2 \frac{e^{1/x}}{x^2} dx \\ &= \left[-e^{1/x} \right]_1^2 \\ &= -e^{1/2} + e \\ &= e - \sqrt{e} \end{aligned}$$

$$\begin{aligned} 5) I_5 &= \int_0^1 (2x+3) \sqrt{x^2+3x+4} dx \\ &= \frac{2}{3} \left[(x^2+3x+4)^{3/2} \right]_0^1 \\ &= \frac{2}{3} (8^{3/2} - 4^{3/2}) \\ &= \frac{13}{3} (2\sqrt{2} - 1) \end{aligned}$$

$$\begin{aligned} 6) I_6 &= \int_0^1 \frac{4x}{1+x^2} dx \\ &= \left[2 \ln(1+x^2) \right]_0^1 \\ &= 2 \ln(2) - 2 \ln(1) \\ &= 2 \ln(2) \end{aligned}$$