

α)

$$\begin{aligned}\int_0^1 \frac{x^2+2}{x^2+1} dx + \int_1^0 \frac{dx}{x^2+1} &= 1 \\ \int_0^1 \frac{x^2+2}{x^2+1} dx + \int_0^1 \frac{-dx}{x^2+1} &= \\ \int_0^1 \left( \frac{x^2+2}{x^2+1} + \frac{-1}{x^2+1} \right) dx &= \\ \int_0^1 \frac{x^2+1}{x^2+1} dx &= \int_0^1 1 dx = \dots 1 - 0 = 1\end{aligned}$$

β)

$$\begin{aligned}g(x) &= \int_a^x f(t) dt \\ \varphi(x) &= \int_\beta^x f(t) dt \\ g(x) - \varphi(x) &= \int_a^x f(t) dt - \int_\beta^x f(t) dt = \int_a^x f(t) dt + \int_\beta^x f(t) dt = \int_a^\beta f(t) dt = F(t) \quad \Big]_\alpha^\beta = F(\beta) - F(\alpha)\end{aligned}$$