

$\alpha)$

$$\int_0^1 \frac{x^2 + 2}{x^2 + 1} dx + \int_1^0 \frac{dx}{x^2 + 1} = 1$$

$$\int_0^1 \frac{x^2 + 2}{x^2 + 1} dx + \int_0^1 \frac{-dx}{x^2 + 1} =$$

$$\int_0^1 \left(\frac{x^2 + 2}{x^2 + 1} + \frac{-1}{x^2 + 1} \right) dx =$$

$$\int_0^1 \frac{x^2 + 1}{x^2 + 1} dx = \int_0^1 1 dx = \dots 1 - 0 = 1$$

$\beta)$

$$g(x) = \int_a^x f(t) dt$$

$$\varphi(x) = \int_\beta^x f(t) dt$$

$$g(x) - \varphi(x) = \int_a^x f(t) dt - \int_\beta^x f(t) dt = \int_a^x f(t) dt + \int_\beta^x f(t) dt = \int_a^\beta f(t) dt = F(t) \Big|_a^\beta = F(\beta) - F(\alpha)$$