

Exercise 4

Prove the following:

$$\begin{aligned} \int_0^x \int_0^{x_1} u(x_1) dt dx_1 + \int_0^x \int_0^{x_1} (x-t)u(x_1) dt dx_1 + \int_0^x \int_0^{x_1} (x-t)^3 u(x_1) dt dx_1 \\ = \frac{1}{4} \int_0^x (x-t)^2 (4 + 2(x-t) + (x-t)^3) u(t) dt \end{aligned}$$

[**TYPO:** The integrands should be $u(t)$, $(x_1 - t)u(t)$, and $(x_1 - t)^3 u(t)$, respectively. Also, only one $(x - t)$ should be factored in the integrand on the right side.]