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$$P_n(x) = \sum_{i=0}^{n} L_{ni}(x) f_i(x)$$

$$P_2(t) = \sum_{i=0}^{2} L_{2i}(t) f_i(t)$$

$$= L_{20}(t) f_0(t) + L_{21}(t) f_1(t) + L_{22}(t) f_2(t)$$

$$= L_{20}(t) f(t_0, y_0) + L_{21}(t) f(t_1, y_1) + L_{22}(t) f(t_2, y_2)$$

$$\rightarrow \int_{t_1}^{t_2} P_2(t)\,dt = f(t_0, y_0) \int_{t_1}^{t_2} L_{20}(t)\,dt + f(t_1, y_1) \int_{t_1}^{t_2} L_{21}(t)\,dt + \cdots$$

$$\cdots + f(t_2, y_2) \int_{t_1}^{t_2} L_{22}(t)\,dt$$

HERE I AM STUCK, INTEGRALS RESULT IN BIZARE TERMS