

$$B_i(u) = \binom{3}{i} u^i (1-u)^{3-i}, B_0(u) = (1-u)^3, B_1(u) = 3u(1-u)^2, B_2(u) = 3u^2(1-u)$$

$$g(u) = B_0(u)r_0 + B_1(u)r_1 + B_2(u)r_2 = (1-u)^3 r_0 + 3u(1-u)^2 r_1 + 3u^2(1-u)r_2$$

$$r_i = (1-u)r_i + ur_{i+1}, i=0,1,2$$

$$r_i = (1-u)r_i + ur_{i+1}, i=0,1$$

$$\begin{aligned} r_0 &= (1-u)r_0 + ur_1 = (1-u)((1-u)r_0 + ur_1) + u((1-u)r_1 + ur_2) \\ &= (1-u)^2 r_0 + 2u(1-u)r_1 + u^2 r_2 = (1-u)^2 ((1-u)r_0 + ur_1) + \\ &\quad 2u(1-u)((1-u)r_1 + ur_2) + u^2 ((1-u)r_2 + ur_3) \\ &= (1-u)^3 r_0 + 3u(1-u)^2 r_1 + 3u^2(1-u)r_2 + u^3 r_3 \end{aligned}$$

$$\boxed{g(u)} = g(u) \checkmark$$