

$$x_t = f_{t-1}^{v_t} \frac{u_{t-1}^{v_t-1}}{\iota} f_{t-2}^{v_{t-1}} \frac{u_{t-2}^{v_{t-1}-2}}{\iota} \dots f_1^{v_2} \frac{u_1^{v_1}}{\iota} f_0^{v_1} \frac{u_0^{v_0}}{\iota} x_0$$

$$g_t \frac{u_t^{v_t}}{\iota} x_t = g_t \frac{u_t^{v_t}}{\iota} f_{t-1}^{v_t} \frac{u_{t-1}^{v_{t-1}-1}}{\iota} f_{t-2}^{v_{t-1}} \frac{u_{t-2}^{v_{t-1}-2}}{\iota} \dots f_1^{v_2} \frac{u_1^{v_1}}{\iota} f_0^{v_1} \frac{u_0^{v_0}}{\iota} x_0$$

$$J_s^{v_s}(x_s) = \max_{(u_t)_s^T} \sum_t^{s|T} \sum_{\omega}^{\Omega} \left( g_t \frac{u_t^{V_t^\omega}}{\iota} f_{t-1}^{V_t^\omega} \frac{u_{t-1}^{V_{t-1}^\omega-1}}{\iota} f_{t-2}^{V_{t-1}^\omega} \frac{u_{t-2}^{V_{t-1}^\omega-2}}{\iota} \dots f_{s+1}^{V_{s+2}^\omega} \frac{u_{s+1}^{V_{s+1}^\omega}}{\iota} f_s^{V_{s+1}^\omega} \frac{u_s^{v_s}}{\iota} x_s \right)$$

$$J_0^{v_0}(x_0) = \max_{(u_t)_0^T} \sum_t^{0|T} \sum_{\omega}^{\Omega} \left( g_t \frac{u_t^{V_t^\omega}}{\iota} f_{t-1}^{V_t^\omega} \frac{u_{t-1}^{V_{t-1}^\omega-1}}{\iota} f_{t-2}^{V_{t-1}^\omega} \frac{u_{t-2}^{V_{t-1}^\omega-2}}{\iota} \dots f_1^{V_2^\omega} \frac{u_1^{V_1^\omega}}{\iota} f_0^{V_1^\omega} \frac{u_0^{v_0}}{\iota} x_0 \right)$$

$$J_s^{v_s}(x_s) = \max_{u_s} g_s \frac{u_s^{v_s}}{\iota} x_s + \sum_{\omega}^{\Omega} J_{s+1}^{V_{s+1}^\omega} \left( f_s^{V_{s+1}^\omega} \frac{u_s^{v_s}}{\iota} x_s \right)$$