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FIZ437E-HW2-Theoric

0.1 Part 1

$$(1.1) \quad V_t = \alpha V_{t-1} + \epsilon g_t$$

$$(1.2) \quad \Delta\theta_t = -V_t$$

$$(2.1) \quad V_t = \beta V_{t-1} + (1 - \beta)g_t$$

$$(2.2) \quad \Delta\theta_t = \delta V_t$$

$$\Delta\theta_{t-1} = -V_{t-1} \quad (t \rightarrow t-1) \quad (\text{from 1.2})$$

$$V_t = -\alpha\Delta\theta_{t-1} + \epsilon g_t \quad (\text{from 1.1})$$

$$V_{t-1} = -\alpha\Delta\theta_{t-2} + \epsilon g_{t-1} \quad (t \rightarrow t-1)$$

$$(I) \quad -\Delta\theta_{t-1} = -\alpha\Delta\theta_{t-2} + \epsilon g_{t-1} \quad (V_{t-1} \rightarrow -\Delta\theta_{t-1})$$

$$\Delta\theta_{t-1} = \delta V_{t-1} \quad (t \rightarrow t-1) \quad (\text{from 2.2})$$

$$V_{t-1} = \frac{1}{\delta}\Delta\theta_{t-1}$$

$$V_t = \beta\frac{1}{\delta}\Delta\theta_{t-1} + (1 - \beta)g_t \quad (\text{from 2.1})$$

$$V_t = \frac{\beta}{\delta}\Delta\theta_{t-1} + (1 - \beta)g_t$$

$$V_{t-1} = \frac{\beta}{\delta}\Delta\theta_{t-2} + (1 - \beta)g_{t-1} \quad (t \rightarrow t-1)$$

$$(II) \quad \frac{1}{\delta}\Delta\theta_{t-1} = \frac{\beta}{\delta}\Delta\theta_{t-2} + (1 - \beta)g_{t-1}$$

$$I: \quad \Delta\theta_{t-1} = \alpha\Delta\theta_{t-2} - \epsilon g_{t-1}$$

$$II: \quad \frac{1}{\delta}\Delta\theta_{t-1} = \frac{\beta}{\delta}\Delta\theta_{t-2} + (1 - \beta)g_{t-1}$$

$$\Delta\theta_{t-1} = \beta\Delta\theta_{t-2} + \delta(1 - \beta)g_{t-1}$$

$$\alpha\Delta\theta_{t-2} - \epsilon g_{t-1} = \beta\Delta\theta_{t-2} + \delta(1 - \beta)g_{t-1}$$

$$\alpha = \beta \text{ and } -\epsilon = \delta(1 - \beta) \rightarrow \epsilon = \delta(\beta - 1)$$