PRINT your student ID: ______________________

$A = V \Lambda V^T$

(1) $\longrightarrow$ $\vec{x}[t+1] = A\vec{x}[t] + \vec{u}$, $\quad \vec{y}[t] = \vec{d}[t]^T \vec{x}[t]$

$\vec{u} = K \vec{d} \boxed{\vec{d}^T x[t]}$

$\rightarrow V \beta V^T \rightarrow \lambda, \vec{v}, \vec{v}^T$

$u[n] = f(y[1], \dots y[n])$

$\vec{d}[t] y$

$u[0] = \alpha \cdot y[0] \cdot d[0]$

$\vec{x}[t+1] = (A + K \vec{d}_t \vec{d}_t^T) \vec{x}[t]$

For (1), the optimal $u[t] = \alpha \cdot y[t] \cdot d[t]$

Minimize $\cdot$ $X[N]$

$X[n] = \sum_{i=1}^{n} A^i x[0] + \sum_{i=1}^{n} A^{i-1} u[i]$ ~~+ noise~~

work out scalar case

State

$N = 1$

Time (1): Prove that $u[0] = \alpha \cdot y[0] \cdot d[0]$

Time 2

$DK^2D = D_v \begin{bmatrix} \beta_1^2 & & & \\ & \beta_1^2 & & \\ & & \ddots & \\ & & & \beta_n^2 \end{bmatrix} D_v$

$\left[\frac{3}{n^2} \beta_i^2 + \frac{1}{n^2} \dots \right]$