

## ECO 318, Practice Problems: Dynamic Programming

Consider the puddle jump problem. A student's utility depends on their health ( $h_t$ ), and the amount of time they spend in freezing water ( $d_t$ ). The instantaneous utility function is  $u(d_t, h_t) = d_t h_t$  and they discount in the standard manner. Health evolves according to:

$$h_t = (1 + \chi)h_{t-1} - d_t \quad (1)$$

where  $\chi > 0$  is the rate of recovery.

Solve for the optimal time spent in freezing water as a function of the student's health.