

AerE 5740: Optimal Control: Spring 2026

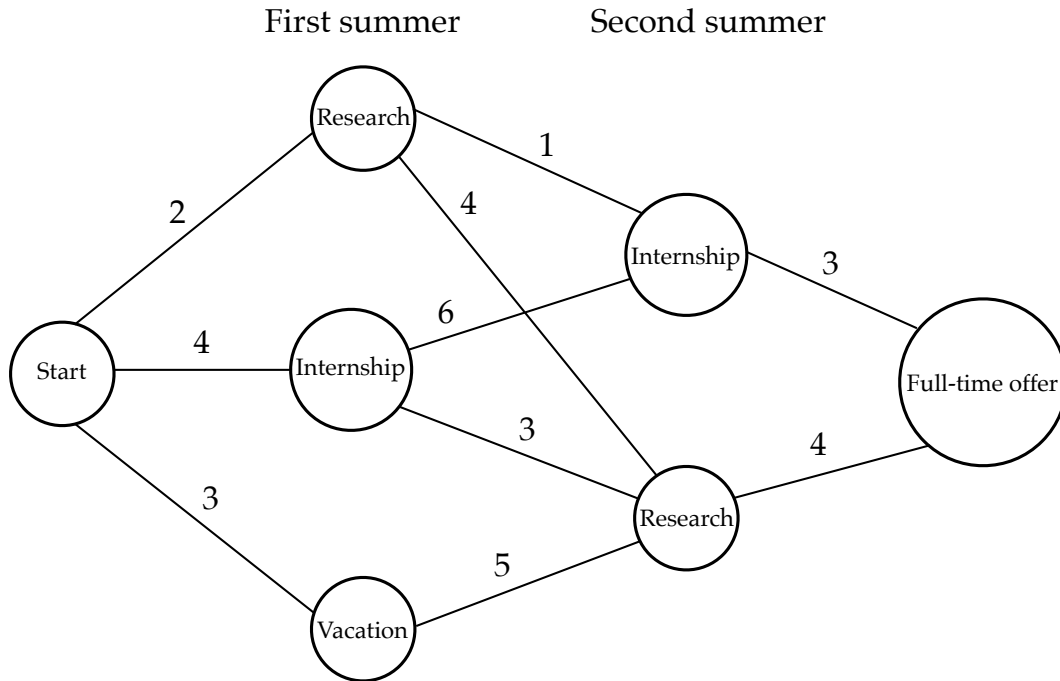
Iowa State University

Quiz 17: Introduction to DP

Name: _____

For each of the following multiple choice problems, ONLY ONE option is correct. Clearly mark the correct option. Calculators or other electronic devices are NOT allowed.

A student starting two year MS degree is wondering how to best spend the next two summers that will land a full-time offer thereafter. The following graph shows the options/states available to the student to spend the first and the second Summer. Only one option/state can be chosen per summer. The numbers along the edges denote the cost of transitioning from one state to the other. All questions below are for this graph.



Let $V(x)$ denotes the optimal cost from state x . Clearly, $V(\text{Full-time offer}) = 0$.

Problem 1

Is $V(\text{Internship in second summer}) < V(\text{Research in second summer})$?

(A) YES. Reason: $V(\text{Internship in second summer}) = 3$,
 $V(\text{Research in second summer}) = 4$.

(B) NO, because $V(\text{Internship in second summer}) > V(\text{Research in second summer})$.

(C) NO, because $V(\text{Internship in second summer}) = V(\text{Research in second summer})$.

Problem 2

$V(\text{Research in first summer}) =$
 $\text{minimum}\{1 + V(\text{Internship in second summer}), 4 + V(\text{Research in second summer})\}.$

(A) TRUE. Reason: see Lec. 18 p. 4.

(B) FALSE.

Problem 3

$V(\text{Internship in first summer}) =$
 $\text{minimum}\{6 + V(\text{Internship in second summer}), 3 + V(\text{Research in second summer})\}.$

(A) TRUE. Reason: see Lec. 18 p. 4.

(B) FALSE.

Problem 4

$V(\text{Vacation in first summer}) = 5 + V(\text{Research in second summer}).$

(A) TRUE. Reason: only feasible transition is to Research in second summer.

(B) FALSE.

Problem 5

The optimal sequence for the student is

(A) Start $\rightarrow$ Research $\rightarrow$ Research $\rightarrow$ Full-time offer.

(B) Start $\rightarrow$ Internship $\rightarrow$ Research $\rightarrow$ Full-time offer.

(C) Start $\rightarrow$ Research $\rightarrow$ Internship $\rightarrow$ Full-time offer. Reason: by backward recursion.