

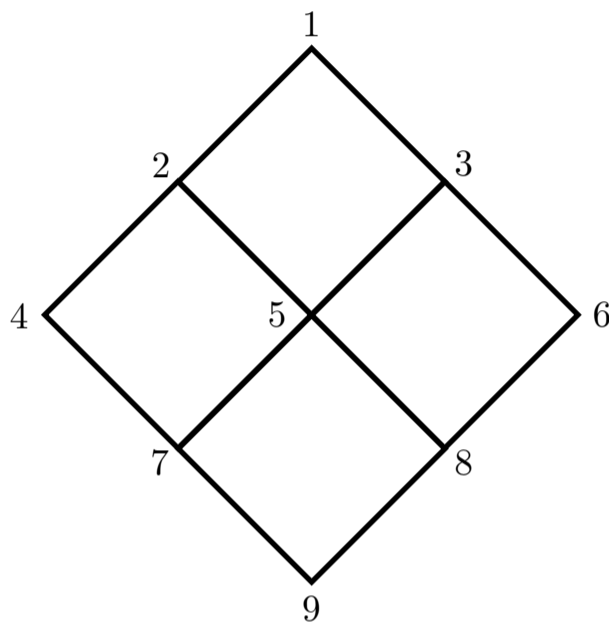
**ELL703 > Problems > Dynamic Programming > Routing**

1. It is desired to go from node 1 to node 9 in the minimum time. Denote  $t_{ij}$  as the time to travel from node  $i$  to node  $j$ , where  $i, j \in \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ , and  $t_{ij}^*$  as the minimum value of  $t_{ij}$ . Travel is restricted from the top to the bottom.

(a) List all paths from 1 to 9. How would you determine the minimum time path?

(b) Formulate the above optimization problem as a recursion. In comparison to (a), is there a reduction in the number of paths for which the time needs to be determined?

(c) What is the simplest order in which the path times should be computed for the recursion in (b)? Why?



2. [Brogan] A student has four hours to study for four exams. For various study times, the marks that will be earned are listed in the Table. Use dynamic programming to find the optimal allocation of time in order to maximize the sum of his four marks. Consider only integer number of hours.

<b>Study Hours</b>	<b>Course #1</b>	<b>Course #2</b>	<b>Course #3</b>	<b>Course #4</b>
<b>0</b>	<b>20</b>	<b>40</b>	<b>40</b>	<b>80</b>
<b>1</b>	<b>45</b>	<b>45</b>	<b>52</b>	<b>91</b>
<b>2</b>	<b>65</b>	<b>57</b>	<b>62</b>	<b>95</b>
<b>3</b>	<b>75</b>	<b>61</b>	<b>71</b>	<b>97</b>
<b>4</b>	<b>83</b>	<b>69</b>	<b>78</b>	<b>98</b>