MA2210 Math. Methods in Decision Making
W. J. Martin
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MA2210 Assignment 5

DUE DATE: Thursday, April 12, 4:00pm.

Please recall the presentation rules for the course.

In each of the following five problems, I ask you to first complete the exercise in the text and then do additional work for each.

For simplicity, assume that the cost of increasing capacity on an arc (due to road widening, or extra toll takers, for example) is proportional to the capacity of that arc. (So, in #30 for example, the arc 2–5 has capacity 4, so will require a $4 million investment to increase its capacity to 5 and an $8 million investment to expand it to 6).

After answering the problem from the text, please add on two subproblems and answer the following for each of the five:

(A) Under the above cost model, what is the cheapest way to increase the value of the flow by 3 units? (HINT: You can solve this by solving three separate shortest path problems.)

(B) Again using the above cost model, find the optimal use of a $10 million budget. What is the best possible increase in total value of the flow that you can achieve at this price? (You are permitted to propose fractional capacities.)

Here are the original five problems:

1. #30 on p302
2. #31 on p302-303
3. #32 on p303
4. #33 on p304
5. #34 on p304

NOTE: In constructing auxiliary networks, you may find it convenient to collapse two parallel edges with the same direction into one. This is easily accomodated in the algorithm. (Ask me about this if what I have written here is confusing.)