COMP9334 Revision Problems for Week 7B

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Question 1

A company has two servers, which we will refer to as Servers 1 and 2. The response time of each server depends on the workload on the server.

For Server 1, if the workload is W_1, then its response time is $3 + 5W_1$. For Server 2, if the workload is W_2, then its response time is $1 + 7W_2$.

Assuming that you have a workload of W units, which you can split between the two servers with the following restrictions:

- A minimum of $W_{1,\text{base}}$ units of workload must be sent to Server 1.

- A minimum of $W_{2,\text{base}}$ units of workload must be sent to Server 2.

- The total workload of the two servers must be W

The response time of the system is defined as the maximum of the response times from the two servers because you need to wait for the workloads from both servers to complete.

Your tasks are:

(a). Formulate a linear programming problem to determine how the workload W should be split between the two servers so that the response time of the system is minimised.

(b). Assuming that $W = 6$, $W_{1,\text{base}} = 0$ and $W_{2,\text{base}} = 0$, solve the linear programming numerically.

(c). Calculate the response times of the two servers using the optimal splitting that you have computed in Part (b). What do you notice? Why do you think this should happen?

(d). Assuming that $W = 6$, $W_{1,\text{base}} = 2.8$ and $W_{2,\text{base}} = 2.8$, solve the linear programming numerically.

(e). Calculate the response times of the two servers using the optimal splitting that you have computed in Part (d). What do you notice? Why do you think this should happen?