

## Exercise B – Real-time Architectures

The processor demand approach for EDF with deadlines less than periods is treated quite differently in the two versions of the book of Buttazzo; see Section 4.5.2 in [1] and Section 4.6 in [2]. Moreover, the theorems in both versions are different. As an example, it is stated that it suffices to consider all deadlines less than or equal to:

- $\min(B_p, H)$  in [1] (Theorem 4.3), and
- $\min(L^*, H)$  in [2] (Theorem 4.4).

Although  $B_p$  and  $L^*$  may be the same, they are typically not. Moreover, the Theorems may be equivalent (i.e. only differ in computational complexity), but it could equally well be the case that Theorem 4.4 resolves a problem occurring for Theorem 4.3.

According to a description on page xii of [2], the topic “is presented with more details”. The aim of this exercise is to find out whether it actually only concerns “more details” or that the 2<sup>nd</sup> edition also resolves a problem occurring in the 1<sup>st</sup> edition.

*Either* prove that the Theorems are equivalent (i.e. always give the same result when applied to an arbitrary set of tasks satisfying the preconditions of both Theorems) *or* show that the Theorems are not equivalent and identify the “faulty” theorem (e.g. by presenting a distinguishing example).

### References

- [1] G.C. Buttazzo, “Hard real-time computing systems, predictable scheduling – algorithms and applications”, Kluwer Academic Publishers, 1997, ISBN 0-7923-9994-3 (1<sup>st</sup> edition).
- [2] G.C. Buttazzo, “Hard real-time computing systems, predictable scheduling – algorithms and applications”, Springer, 2004, ISBN 0-387-23137-4 (2<sup>nd</sup> edition).