|  |  |
| --- | --- |
| MOW 323 – Semester test 1 | Question 4 |
| Name and Surname | Lanz Ebersohn |
| Student number | u18285229 |

(a) Since the first 2 natural frequencies of the structure correspond almost exactly to the last two of the given frequencies of 181.6 and 279.2 Hz, it will be one of them. Typically the first natural frequency will result in the largest amplification factor. Thus, 181.6 Hz will produce the largest frequency.

(b) From the notebook under question b.) we can see that the decrease in cross-sectional area has no effect on the natural frequencies. Secondly, if node 3 is move up by 1 unit there is no change in the first natural frequency. Lastly, the only change that had an effect was lowering node 3 by one unit. However **none** of these 3 suggestions increased the first natural frequency.

(c) The stress in element 1 = 12.25 MPa, and the stress in element 3 is 0.278 MPa. See graphs in Jupyter notebook under section c.)

(d) The risk is that the transient solution may exceed the yield unknowingly. Or even if the yield isn’t reached in the transient load case, if the transient case happens often enough then it may lead to fatigue failure down the line.

(e) The critical safety factor is on element 1 with a safety factor of 24.5. See results in Jupyter notebook under section e.)