| Last Name |  |
| --- | --- |
| First Name |  |

**Task 0. Theory: Static determinacy**

0.1 Identify the four structures shown in the Gitbook. Fill in the following table.

| No. | Structure type | Static determinacy | Degree of freedom |
| --- | --- | --- | --- |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |

0.2 Describe the main difference between an arch-cable and a truss. Why does an arch-cable structure have a degree of freedom of 1 (maximum 50 words)?

…

**Task 1**. **Analysis of truss bridges**

1.1 Paste a screenshot of the **form** and **force** **diagram** obtained for the three trusses:

| screenshot of the Rhino viewport,  showing the form and force diagram  for the truss 1 |
| --- |

| screenshot of the Rhino viewport,  showing the form and force diagram  for the truss 2 |
| --- |

| screenshot of the Rhino viewport,  showing the form and force diagram  for the truss 3 |
| --- |

1.2: Compare the **truss 1** with the truss we have analyzed in tutorial 2. List the difference between the two trusses. (maximum 25 words)

…

1.3: Change the **support locations** of **truss 2** so that the top chord is in tension and the bottom chord is in compression. Modify the input lines for truss 2 and compute the form and force diagram.

| screenshot of the Rhino viewport,  showing the form and force diagram  of modified truss 2 |
| --- |

1.4 In truss 3, which members of the top and bottom chords have the largest forces? Which members in the diagonals have the largest forces? What are the force magnitudes in these members?

…

1.5 Perform a geometric modification of truss 3 so that the internal forces in the members are reduced.

| screenshot of the Rhino viewport,  showing the form and force diagram  of modified truss 3 |
| --- |

**Task 2**. **Cantilever arch-cable structure**

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2.1 Describe the steps you use to form-find the arch under the deck's weight (e.g., supports, constraints). Paste a screenshot of the form and force diagram of the arch **before you add constraints** and the form-finding result **with constraints.**

…

| screenshot of the Rhino viewport,  showing the form and force diagram without constraints |
| --- |

| screenshot of the Rhino viewport,  showing the form and force diagram with constraints |
| --- |

2.2 Paste a screenshot of the form and force diagram of the arch-cable cantilever structure.

| screenshot of the Rhino viewport,  showing the form and force of the arch-cable cantilever structure. |
| --- |

2.3 Assume that the load on the structure is no longer uniform. Could you propose a modification to stabilize the structure under the non-uniform loads? Shortly describe your thoughts (maximum 50 words) and paste a screenshot of the form and force diagram of the result.

…

| screenshot of the Rhino viewport,  showing the form and force of the arch-cable cantilever structure  under non-uniform load |
| --- |

2.4 Assume that we want to achieve constant force in the lower chord. Is it possible to find a design solution considering the current support locations? If it's possible, compute the final results. If it's not possible, could you propose a solution to achieve constant force? Shortly describe your thoughts (maximum 50 words) and paste a screenshot of the form and force diagram of the result.

…

| screenshot of the Rhino viewport,  showing the form and force of the arch-cable cantilever structure  with constant force in the lower chord |
| --- |

**Task 3**. **Design your bridge**

3.1 Paste a screenshot of the form and force diagram of your bridge design 1.

| screenshot of the form and force diagrams  of your truss bridge design 1. |
| --- |

3.2 Briefly describe the structural and architectural aspects of your design 1 and the steps you used to achieve it (max. 100 words).

…

3.3 Paste a screenshot of the form and force diagram of your bridge design 2.

| screenshot of the form and force diagrams  of your arch-cable bridge design. |
| --- |

3.4 Briefly describe the structural and architectural aspects of your design 2 and the steps you used to achieve it(max. 100 words).

…