Assignment 3: Biomechanics

**Goal of the assignment**

* Practice the making of a free-body-diagram

**Assignment**

You are asked to draw and use a Free-body-diagram

1.

Look at this situation: you are sitting straight up at your desk, your arms hanging down beside your body

* Draw a sketch in a side view of this situation
* Draw a sketch in a side view of your upper body (intersection through your belly button), leave out your arms (so draw trunk and head only)
* Draw a free-body-diagram in this sketch
* Explain with this free-body-diagram why the forces in your back muscles and on your low back vertebrae increase when you bend forwards

2.

Imagine two situations of a person working with a keyboard on the table, now including the arms; the first with the elbows leaning on the armrests / or on the desk. The other with the arms hanging freely in the air (unsupported).

* Draw in two sketches the side views of the situation (in the first situation you can choose for leaning on the armrests or on the table)
* Explain by making free-body-diagrams what is the difference in forces in the arms and shoulders.

3.

And lastly, look at the situation below where you sit at a desk, bending forwards with your neck, supporting your arms on the desk top.

* Draw a free-body-diagram to explain why the load on the neck muscles and on the cervical vertebrae is higher than compared to a situation in which you are sitting straight in front of your screen. Estimate the load on the neck muscles.

