Foundations of Multimedia technologies Midterm exam. 2021.04.16.
Please give the answers in the blank space below the questions and on
further additional blank papers *with indicating the name, Neptun ID and the
no. of the given question*!
Total: 40 points 0-19 points: failure (1), 20-24 points: poor (2), 25-29 points:
satisfactory (3), 30-34 points: good (4), 35-40 points: excellent (5)

Name: _____

Neptun ID: _____

1. 15 point The luminance in the ITU-601 system is given as $Y = 0.3R + 0.59G + 0.11B$, while the Gamma-correction curve is given as

$$V' = \begin{cases} 4.500V & V < 0.018 \\ 1.099V^{0.45} - 0.099 & V \geq 0.018 \end{cases}$$

Assume that we have a color pixel with the RGB coordinates given by $[1\,0\,0]$. What is the luminance, hue and saturation of the color pixel? Define the luma and the chroma value of the color pixel!

2. 10 point Describe the role and characteristics of Gamma-correction (Opto-electronic Transfer Function, OETF) and illustrate the process with a block diagram! The explanation should include the aspects, concerning the choice of bit/sample (quantization bit depth) and perceptual quantization!

3. 5 point What is chroma-subsampling, why was it introduced and what does the chroma subsampling scheme notation indicates? What common chroma subsampling schemes are used in practice?

4. 5 point What considerations lead to the introduction of interlaced television system? The explanation should include perceptual aspects of choosing the frame rates in SD systems.

5. 5 point What is the common SD sampling frequency in European and American systems? What considerations lead to this choice?

6. 10 point Calculate the optimal viewing distance for a HDTV display with the aspect ratio of 16:9 and the diameter being 60 inches (153 cm) in case of watching a full HD content with 1080 active lines!

7. 10 point Draw and analyize the block diagram of a feedback differential quantizer and the corresponding decoder! Explain, why feedback structure is used in the encoder side instead of the more simple feedforward structure!