Foundations of Multimedia technologies Exam. 2021.06.11.
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: 100 points 0-40 points: failure (1), 41-55 points: poor (2), 56-70 points: satisfactory (3), 71-85 points: good (4), 86-100 points: excellent (5)

Név: _____

Neptun kód: _____

1. ☐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!

2. ☐15 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?

3. ☐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!

4. ☐10 point☐ Calculate the active bitrate of a 4k UHDTV video stream (number of active pixels: 3840x2160 at frame rate of 60 Hz, with progressive scanning) if the chroma components are subsampled with a sampling scheme 4:2:0 and components are represented in 10 bits/sample!

5. ☐10 point☐ What is the general goal of transform coding? What is the optimal transform and name several sub-optimal, fixed base transforms.

6. ☐20 point☐ Draw the block diagram of an MPEG encoder! Explain the steps of the encoding process if the applied GOP structure is IBBP!

7. ☐10 point☐ Audio encoding

   - Why do we apply psychoacoustic encoding (mp3, dolby digital, etc.) at all?
   - What kind of error do we introduce to the uncompressed audio by applying a psychoacoustic encoding?
   - Why (or when) isn't it a problem that we introduced this error to our audio signal?

8. ☐3 point☐ What are the basic axioms of image processing?

9. ☐7 point☐ List the types of edge detection algorithms and explain their mathematical background!

10. ☐5 point☐ List the steps of SIFT detector!