

Foundations of Multimedia technologies Midterm exam. 2019.04.12.

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. **5 point** What is the definition of luminance, hue and saturation perceptual parameters in a television color measure system?
2. **10 point** Give the luma and chroma components in the ITU-601 SD system for the fully saturated 100% intensity colors (saturation_{TV} = 1 with maximal R,G,B components)! 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

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

3. **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!
4. **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?
5. **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.
6. **5 point** What is the common SD sampling frequency in European and American systems? What considerations lead to this choice?
7. **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!
8. **10 point** Draw and analyze 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!