

## EXAM for 8004253 Virtual Reality (3 cu)

Answer shortly but sufficiently in English. Less than one page for each problem is enough!

Write clearly to each paper:

- 8004253 Virtual Reality
- Date
- Name
- Student number

1. **Terminology.** Explain shortly the following terminology. 1-2 sentences are enough. (12 points)
  - a) Immersion
  - b) Accommodation of the human eye
  - c) Augmented reality
  - d) Mixed reality
  - e) Polygon
  - f) VRML
2. **Foundations.** List and describe the depth cues that human vision system uses. Which of them are binocular? Which are dominant? (12 points)
3. **Application.** A big university hospital wants to start using a VR-based simulator for surgery students. Describe what kind of a system you would design. Explain the technical components and the overall system. Set an estimate price tag on your system, and give some explanation and specification on the price. How real experience could your system produce? (12 points)
4. **Technology.** A collaborative virtual environment system is to be built with  $N$  client systems. Each client produces position updates with frequency 10Hz. Discuss the relative benefits of a client-server architecture and a peer-to-peer architecture with reference to load on different parts of the system, and effect on user-experience. If  $N$  is very large then neither a pure client-server nor peer-to-peer architecture will suffice. Outline the range of common approaches to scaling the number of clients. (12 points)
5. **Concepts.** Answer shortly. 1-2 sentences are enough. (12 points)
  - a) What are autostereoscopic displays and how do they work?
  - b) How many viewers can observe correctly tracked scenes in a CAVE? What do the others see?
  - c) On which direction is the human precision of locating sounds the highest? Where is it the lowest?
  - d) What are the three basic principles of human hearing for sensing the direction of sound?
  - e) Both HMDs and shutter glasses use some sort of LCD panels. What is their fundamental difference?
  - f) What are the typical problems of acoustic trackers?