OHJ-2700 Tietokonegrafiikka (Computer Graphics 6op)
Examination Questions, Artur Lugmayr

1. True/False questions: please answer if the following statements are either true or false, and give the reason why.
   - When a 2D point p is given, and a translation (T1) and a rotation (R) and another translation (T2) is applied, the order of applying transformations to the 2D point does not matter (true/false)
   - Ray tracing is a technique for intersection tests to find out, which light beams cross each other (true/false)
   - The Bresenham line algorithm is used to calculate a parallel projection (true/false)

2. Basic vector operations
   - explain the dot product of two n-dimensional vectors and how it is calculated
   - explain the cross product of two n-dimensional vectors and how it is calculated
   - which practical applications in computer graphics exist for both, dot product and cross product?

3. Geometric transformations
   - Illustrate the basic three transformation of 2D points with matrix operations. Eventually use a figure to underline the transformations.
   - Illustrate the basic three transformation of 3D points with matrix operations as 3-dimensional affine transformations. Eventually use a figure to underline the transformations

4. Describe the three different components of the 3D graphics pipeline. What are their tasks, objectives and underlying principles?

5. Color representation
   - What is gamma correction? Why is it needed and how is it applied? What is its practical application?
   - What represents the alpha channel? How can it be used and why is it needed? What is the practical application of the alpha channel?
   - Explain the HSV color model by example and compare it to other possible color models.

6. What are Bezier curves? Illustrate Bezier curves by using a figure and explain the principles behind the idea of Bezier curves.

7. How is it possible to render surfaces in terms of lighting and shading? What is the idea behind the different techniques? Explain it on one example (e.g. diffuse reflection, ambient light, point light sources, fading light, specular reflection, etc.)

8. Your task would be to implement an indoor action game. How would you approach the realization of the game? What is needed in terms of modeling, rendering, game engine, or input devices? *Remark: The goal of this question is to apply the knowledge acquired within the course. It is more a question of understanding, and any topic that has been presented is adequate to answer this question if related to this compute rgame. A few hints: rendering indoor scenes, graphics pipeline, spatial containers, shading, lightening models, stencil buffer, etc.*