

# Exam 1TD388, 2021-08-27

⚠ Det här är en förhandsvisning av den publicerade versionen av quizet

Startad: 2 dec kl 15.13

## Instruktioner för Quiz

In the first question of this quiz, you will be asked to upload an image of some ID (photo of your ID card, driver's license, or passport). This is to verify that you were the person who wrote and handed in the exam. Then, you are supposed to pick the correct statements for each of the questions. An example:

If a question has maximum  $N$  points and there are  $x$  choices that are correct, then each correct answer awards you  $N/x$  points, while every wrong answers will reduce by  $N/x$ . But you cannot get less than zero per question! In other words, if a question has 6 points and 4 answers are correct then every correct answer you choose will give you 1.5p. If you do not choose a correct answer you will not get the 1.5p for that choice. But if you choose a wrong answer the total credit will be reduced by 1.5p, but you cannot get less than zero.

Please take as much time as you need to answer the questions as well as possible. However, hand-in time will play a factor if you are less than 1 point from a higher grade: if you completed the exam in less than 2.5 hours (half the time), your score will be rounded up, otherwise, it will be rounded down. The motivation for this is that if you took longer time, you probably had to go back more often and look up things in the book and the course material. But do not feel any stress, and submit the exam when you are satisfied with your answers!

Note that the questions cover the general case: there might be some special case we as teachers have not thought about (but clever students would think of). What should you do then? Remember we are not clever students, so answer for the general case!



Time limits:

5: 35p   4: 28p   3: 20p

You can always email [fredrik.nysjo@it.uu.se](mailto:fredrik.nysjo@it.uu.se) during the exam if something is unclear! (I will be available 8:00-10:00, and after 12:00)

Good luck!

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### Fråga 1

0 poäng

Please upload your ID (e.g. student ID, drivers licence or passport)

Ladda upp

Välj en fil

## Fråga 2

3 poäng

$$\frac{1}{a+bd+cd^2} (K_a L_a + K_d L_d \max(\mathbf{N} \cdot \mathbf{L}, 0) + K_s L_s (\mathbf{R} \cdot \mathbf{V})^\alpha)$$

- ☐ The max function is used in the equation so that the light intensity does not become negative, as there is no such thing as negative light.
- ☐ The exponent (alpha) in the Phong Illumination equation above regulates the size of the specular highlight.
- ☐ The equation above does include the distance falloff.
- ☐ The above equation uses the halfway vector introduced by J. Blinn.
- ☐ The three constants  $L_a$ ,  $L_d$ ,  $L_s$  in the equation above usually represents the color of the Material with respect to ambient, diffuse and specular light, respectively.
- ☐ In the equation above, the diffuse component is computed using the Lambert law of cosines, which defines how much light is spread out over a surface, depending on the angle of the light source direction and the normal.



## Fråga 3

3 poäng

What features describes Phong shading correctly?

- ☐ It has worse Mach band problems than Gouraud
- ☐ It creates better shading than Gouraud
- ☐ It produces better highlights than Gouraud
- ☐ It computes the Phong illumination equation per pixel

- ☐ It interpolates colours over the polygon
- ☐ It is generally much faster than Gouraud

#### Fråga 4

3 poäng

What is true about raytracing?

- ☐ It is generally more computational expensive than Phong shading
- ☐ It is often used for specular surfaces
- ☐ It can not be used for translucent objects
- ☐ The phong illumination equation is often replaced by a BRDF or similar
- ☐ It can be used for matte surfaces
- ☐ It uses the form factor

#### Fråga 5

2 poäng

What is true about the Sutherland-Hodgeman clipper?

- ☐ All stages in the pipeline can be done on parallel
- ☐ It does not perform backface culling
- ☐ It is a pipeline clipper
- ☐ It cannot clip triangles, just lines
- ☐ It is based on scissoring

#### Fråga 6

2 poäng

If you would make an object that looks like an orange that is slightly dirty, what rendering techniques would use to **make it look like** a real orange?

- ☐ Back face culling
- ☐ Texture mapping
- ☐ Scissoring
- ☐ Environment mapping
- ☐ Bump mapping

### Fråga 7

2 poäng

If you would make an object that looks like smooth clean shiny silver ball, **what techniques wold you typically use so it looks good?**

- ☐ Texture mapping
- ☐ Back face culling
- ☐ Scissoring
- ☐ Environment mapping
- ☐ Bump mapping



### Fråga 8

2 poäng

In a typical graphics pipeline, what comes after projection? (Include all stages in your answer)

- ☐ Z-buffering
- ☐ View normalisation
- ☐ 3D clipping
- ☐ Shading

☐ Rasterisation

### Fråga 9

2 poäng

What are the purposes of mipmapping?

- ☐ To increase rendering speed
- ☐ To perform back face culling efficiently
- ☐ To make faster clipping
- ☐ To perform antialiasing
- ☐ To be able to use Gouraud instead of Phong Shading

### Fråga 10

2 poäng

What is correct about fix point rotations?

- ☐ They are much faster than rotation around the origin
- ☐ It makes it possible to rotate an object, despite its position in space
- ☐ Only ONE matrix is used to do all transformations needed to perform the rotation
- ☐ It is a mix of scaling and rotation operations
- ☐ They are frequently used to be able to animate complex objects



### Fråga 11

2 poäng

What is true about rotation matrices?

- ☐ The matrix looks exactly the same for rotation around any axis. It is just the functions that

change sign

- ☐ They contain arc functions
- ☐ They contain the sine and cosine
- ☐ The norm of all columns are 1
- ☐ Homogenous coordinates are necessary

## Fråga 12

2 poäng

What is true about translation matrices?

- ☐ The norm of each row is 0
- ☐ Homogenous coordinates are necessary
- ☐ They typically have a column or a row where the translation for each axis is found
- ☐ They cannot be combined with scaling matrices through matrix multiplication
- ☐ The diagonal is set to 1

## Fråga 13

2 poäng



What is true about perspective projection?

- ☐ It is computed by first defining a centre of projection
- ☐ All vertexes are projection onto the front clipping plane
- ☐ In early medieval paintings the perspective is often wrong
- ☐ It is exactly the same as Orthogonal projection
- ☐ perspective division will make sure that objects further away look smaller

### Fråga 14

3 poäng

What is true about splines?

- ☐ B-splines can be used to create smooth camera movements in a scene
- ☐ They can theoretically be of any positive degree, but 3 is preferred in Computer Graphics
- ☐ B-splines generally do not intersect the control points
- ☐ All cubic splines has C3 continuity
- ☐ Bernstein polynomials always have degree 3
- ☐ The Utah teapot was created using Bezier Patches

### Fråga 15

3 poäng

What is true about Global Illumination algorithms?

- ☐ The so called form factor, is essential for the Half way vector computation.
- ☐ Octrees can be used to divide 3D space so that ray/triangle intersections are computed faster.
- ☐ Radiosity is usually used for highly specular surfaces and translucent surfaces.
- ☐ Raytracing is first of all aimed for matte surfaces (computing diffuse light only).
- ☐ Bounding objects are typically used to improve the speed in which ray/triangle intersections are computed.
- ☐ Bounding spheres are faster to compute than bounding boxes

### Fråga 16

2 poäng

What is true about hidden surface removal and clipping?

- ☐ Clipping can be done for both orthogonal and perspective projections

- ☐ Backface culling is a method to improve interpolation over triangles in Gouraud shading.
- ☐ A typical pipeline clipper divides the space into 9 regions and compute out codes for fast clipping.
- ☐ Clipping can typically be done either before or after projection. I.e. clipping can be performed in 3D or in 2D.

### Fråga 17

3 poäng

What is true about render-to-texture and post-processing effects?

- ☐ The resolution of color and depth attachments in a framebuffer object does not have to be the same as the screen resolution or the window size
- ☐ Post-processing effects are typically computed in the vertex shader stage
- ☐ The use of framebuffer objects allows us to render much more complex models with more triangles
- ☐ Ray tracing is often used in shadow mapping to render the depth image for the shadow map
- ☐ Ambient occlusion is a technique for rendering hard shadows from ambient light

### Fråga 18

2 poäng

What is true about volume rendering?

- ☐ Cube mapping is a technique that can be used to directly render the voxels of a volume
- ☐ A GPU with 4 GB video memory can easily store a volume with  $2048^3$  voxels (assuming each voxel takes up 1 byte)
- ☐ The quality of volume rendering is dependant on the resolution of the voxel data
- ☐ Maximum intensity projection (MIP) is not useful for rendering isosurfaces in a volume



Inte sparad

Lämna in quiz

