Computer Graphics – Sample Exam

Exam consist of 15 mulitchoice tasks, each chaving three questions with answers **Yes** or **No**. For each correct answer you get 1 point and for three correct answers within one task there is 1 bonus point. Thus, for each task it is possible to get **0, 1, 2, or 4 points**. To pass the exam it is necessary to get at least **30** points (half of all points).
Time: **60 minutes**. *Good luck!*

Task 1. *Complementary color to red in RGB model is*

- $(0, 0, 1)$
- $(0, 1, 1)$
- $(1, 1, 0)$

Task 2. *The following is true:*

- *RGB is an additive color model*
- *CMYK is a subtractive color model*
- *if we add green and blue colors in RGB model, then we get cyan color*

Task 3. *The following is true:*

- *scan line is an algorithm with an object precision*
- *Z-buffer is an algorithm with an image precision*
- *in a backface removal algorithm we need to know the normal vector to each face of an object*

Task 4. *Points* $(1, 0, 3)$ *and* $(2, 0, 6)$ *in 3D space*

- *have the same homogeneous coordinates*
- *lie on a line through zero*
- *are obtained by scaling a point* $(-5, 0, 15)$

Task 5. *Consider homogeneous coordinates* (x, y, z, w)*,* $w \neq 0$*,* $w \neq 1$ *of some point* p*. Then*

- $p = (x, y, z)$
- $p = (xw, yw, zw)$
- p *can be also represented in homogeneous coordinates as* $(x, y, z, 1$

Task 6. *Consider a clockwise rotation* R *by* 45 *degrees in 2D space. Then*

- *points* p *and* $R(p)$ *are equidistant from origin* $(0, 0)$*,*
- *if* $p = (0, 1)$*, then* $R(p) = (\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$*,*
- R *commutes with a translation* T *by a vector* $(1, 1)$*, that is,* $RT = TR$*.*

Task 7. *The following is true:*

- *Ambient light is sourceless,*
- *Diffuse and specular lights have a source,*
- *The intensity of a light depends on the distance from the source.*

Task 8. *In OpenGL 2.1 to rotate (counterclockwise) object by* 45 *degrees around vector* $1, 1, 1$ *we may apply*

- `glRotatef(45,1,1,1)`
- `glRotatef(-30,2,2,2)`

`glRotatef(315,1,1,1)`

Task 9. *In the Z-buffer algorithm for hidden surface removal:*

we create a buffer which keeps information for each pixel separetly

the buffer "remembers" the information about z-coordinate of objects

finally, in the z-buffer we have information about colors of closest objects (for each pixel separetly)

Task 10. *If* $p = (1, 2, 3)$ *and we apply tranfsormation* `glTranslatef(-1, -1, 2)` *to* p*, then*

the new position of p *is* $(0, 1, 1)$

the new position of p *is* $(0, 1, 5)$

the distance between new and old positions of p *is* $\sqrt{15}$

Task 11. *The following is true:*

formula $(x, y, z) \mapsto (x, y)$ *defines orthographic projection*

formula $(x, y, z) \mapsto (\frac{xz}{z+1}, \frac{yz}{z+1})$ *defines perspective projection*

formula $(x, y, z) \mapsto (\frac{x}{1+z}, \frac{y}{1+z}$ *defines prespective projection*

Task 12. *Let* T_1 *and* T_2 *be translations. Then*

T_1T_2 *is a translation*

the inverse T_1^{-1} *is a translation*

$T_1 + T_2$ *is a translation*

Task 13. *Let* T *be a translation by a vector* $(1, -1)$*and* S *a scaling with scales* $s_x = 2$ *and* $s_y = 3$*. Then*

$T(x, y) = (x + 1, y + 1)$

$TS(x, y) = (2x + 1, 3y - 1)$

$ST(x, y) = (2x + 2, 3y - 3)$

Task 14. *If* N *is a normal vector to a face and* L *is a vector from the face to the source of the light, then*

the angle between N *and the reflected ray from the face is the same as the angle between* N *and* L

the angle between N *and the reflected ray from the face is equal minus the angle between* N *and* L

diffuse component of the intensity of the reflected ray of light depends on the angle between N *and* L

Task 15. *The following is true*

In raster graphics image is made of pixels

Scaling doesn't change the quality of an image in raster graphics

In vector graphics the information about an image is given by mathematical formulas and properties of shapes