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*

No) $(0, 0, 1)$

Yes) $(0, 1, 1)$

No) $(1, 1, 0)$

Task 2. *The following is true:*

Yes) RGB is an additive color model

Yes) CMYK is a subtractive color model

Yes) if we add green and blue colors in RGB model, then we get cyan color

Task 3. *The following is true:*

No) scan line is an algorithm with an object precision

Yes) Z-buffer is an algorithm with an image precision

Yes) 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*

NO) have the same homogeneous coordinates

Yes) lie on a line through zero

No) 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*

No) $p = (x, y, z)$

No) $p = (xw, yw, zw)$

No) 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*

Yes) points p *and* $R(p)$ *are equidistant from origin* $(0, 0)$,

Yes) if $p = (0, 1)$, *then* $R(p) = (\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$,

$$\begin{pmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{pmatrix} = \begin{pmatrix} \sqrt{2}/2 & \sqrt{2}/2 \\ \sqrt{2}/2 & \sqrt{2}/2 \end{pmatrix} \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \frac{\sqrt{2}}{2}(1,1)$$

No) R commutes with a translation T *by a vector* $(1, 1)$, *that is,* $RT = TR$.

Task 7. *The following is true:*

Yes) Ambient light is sourceless,

Yes) Diffuse and specular lights have a source,

Yes) 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*

Yes) `glRotatef(45,1,1,1)`

No) `glRotatef(-30,2,2,2)`

No) `glRotatef(315,1,1,1)`

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

Yes) *we create a buffer which keeps information for each pixel separetly*

No) *the buffer "remembers" the information about z-coordinate of objects* It's faces not objects

Yes) *finally, in the z-buffer we have information about colors of closest objects (for each pixel separetly)* In this case, objects and faces is the same.

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

No) *the new position of* p *is* $(0, 1, 1)$

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

No) *the distance between new and old positions of* p *is* $\sqrt{15}$

Task 11. *The following is true:*

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

No) *formula* $(x, y, z) \mapsto (\frac{xz}{z+1}, \frac{yz}{z+1})$ *defines perspective projection*

YeS) *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*

Yes) T_1T_2 *is a translation*

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

No) $T_1 + T_2$ *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*

No) $T(x, y) = (x + 1, y + 1)$

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

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

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*

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

No) *the angle between* N *and the reflected ray from the face is equal minus the angle between* N *and* L

Yes) *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*

Yes) *In raster graphics image is made of pixels*

No) *Scaling doesn't change the quality of an image in raster graphics*

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