

CPSC 453 – Self-test – Oct 7-8, 2019

1) Who developed the first interactive graphics system:

- Ivan Sutherland at MIT?
- Alvy Ray Smith At the University of Utah?
- Marcelli Wein and Nestor Burtnyk at the NRC?

2) What is the value of $\sin\left(\frac{\pi}{4}\right)$?

3) What does it mean that vector multiplication is distributive over addition?

4) Does the equality $\vec{a}(\vec{b} \cdot \vec{c}) = (\vec{a} \cdot \vec{b})\vec{c}$ hold for any vectors $\vec{a}, \vec{b}, \vec{c}$? Some vectors? Never? Justify your answer.

5) Consider vectors defined as follows:

```
struct V3f
{
    float x, y, z;
    V3f(float x1, float y1, float z1)
        {x=x1; y=y1; z = z1}
    V3f()
        {x=0; y=0; z=0}
};
```

Define the overloaded operator \wedge for computing the cross product of two vectors in C++.

6) Write the transformation matrix for rotating by angle α around the x axis in 3D.

7) Point P has homogeneous coordinates $[4 \ 2 \ 1 \ 0.5]^T$. What are its x, y, z coordinates in 3D?

7) Which of the following operation(s) cannot be performed as matrix multiplication unless homogeneous coordinates are used:

- Translation
- Scaling with respect to the origin of the coordinate system
- Parallel projection
- Perspective projection
- Rotation with respect to the origin of the coordinate system

8) What is Rodrigues's formula for?

9) What is the "canonical view volume"

10) Oblique projections are a special case of:

- Orthographic projections
- Parallel projections
- One-point perspective
- Two-point perspective
- Three-point perspective