**CPSC 453 – Self-test – Oct 7-8, 2019**

1) Who developed the first interactive computer animation system:

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

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

3) Which of the following operation(s) is/are commutative:

- ☐ Vector addition
- ☐ Vector subtraction
- ☐ Dot Product
- ☐ Cross product
- ☐ Multiplication of a vector by a number.

4) Does the equality $\vec{a}\times(\vec{b}\times\vec{c}) = (\vec{a}\times\vec{b})\times\vec{c}$ 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, flat z1)
                {x=x1; y=y1; z = z1}
        V3f()
                {x=0; y=0; z=0}
};
```

Define the overloaded operator * for computing the dot product of two vectors in C++.

6) Write the transformation matrix for rotating by angle $\alpha$ around the $y$ axis in 3D.

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

7) Which of the following operation(s) can be performed as matrix multiplication without using homogeneous coordinates:

- ☐ 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 are the normalized device coordinates (NDC)?

10) Oblique projections are a special case of:

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