Written Assignment 2 Solution

1A) \(a=0, \ d=0\)

1B) \(c= 1/\sqrt{2}\) or \(-1/\sqrt{2}\)

1C) \(e= -1/\sqrt{2}\), \(f = 1/\sqrt{2}\)

2A) \(x= \sqrt{3}/2, \ -\sqrt{3}/2\)

\(y= 0\)

\(z= -1/2, \ + 1/2\)

3) Most of you got it right this time but I guess some are still confused. I think I should rephrase what I said in the last homework solution – “\(v' = A*B*C*v = A*(B*(C*v))\)” where \(A,B,C\) are transformations that occur in that order – order here refers to their order in the OpenGL code. So \(A\) occurs first in the CODE followed by \(B\) and then \(C\). But what OpenGL does is multiply the input vertices with \(C\) first then \(B\) then \(A\).

For this question we need OpenGL to first multiply the origin with \(M\) (modeling transformation) then \(C\) (camera transformation) and then \(P\) (projection transformation).

When I say multiply first with \(M\) and then \(C\), \(P\) I mean \((P \times (C \times (M \times V)))\). This will give the correct answer for this question –

\([-3; 1; 1; -8 \] but we need to keep \(w=1\) so divide by \(-8\). And the answer is –

\(x= 3/8\)

\(y= -1/8\)

So now if you had to write this in OpenGL code you have to apply them in the reverse order – first \(P\) then \(C\) then \(M\).
4) \( e = (5, 5, 5) \)
   \( t = (0, 1, 0) \)
   \( g = (0, -5, -5) \)

\( w = (0, 1, 1) / \sqrt{2} \)
\( u = (1, 0, 0) \)
\( v = (0, 1, -1) / \sqrt{2} \)

\[ \text{Mcam} = \begin{bmatrix} u & v & w & e \end{bmatrix}^{-1} \]
\[ \begin{bmatrix} 0 & 0 & 0 & 1 \end{bmatrix} \]