

2007/2008 Graphics Tutorial 5

Problem 1 *Our model has an object centered at the point $(7, 16, 18)$. Instead of looking at it from the origin, we want to look at it from behind and above, so we place the origin of our camera at $(10, 20, 30)$. What is the gaze vector we should specify so that the object is centered in the image?*

Problem 2 *For our camera in the previous problem, we specify an view-up vector of $(0, 1, 0)$. We are going to do projection in the way it is explained in Chapter 6 of the textbook. Explain how we compute the matrix that does the viewing transform (called M_v). If you want to compute the actual numbers, beware that they are not really nice (they contain fractions and square roots), so calculating may take some while. However, it is instructional to do such calculations at least once.*

Problem 3 *Our camera hasn't been completely specified yet. Amongst other things, we need to set the near and far plane distances. Let's set them at -1 and -100 , respectively (recall that we view along the negative w -axis. What is the matrix that does the perspective transformation, given these values? (Note that in this case, the numbers are much nicer.)*

Problem 4 *The final matrix that we need to construct is M_o , the one that takes care of the orthographic projection. Let's specify an image of width times height is 1024×768 , and left, right, top and bottom plane parameters of -4 , 4 , -3 , and 4 , respectively. Determine M_o , given these parameters.*

Problem 5 *If you dare, compute the full matrix $M = M_o M_p M_v$. Onto which pixel is the point $(7, 16, 18)$ projected? Recall that we wanted it to be centered in the image.*