CPSC 314
Computer Graphics
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Quiz 1 prep, Frames

Announcements

- Quiz 1 preparation tips
- Assignments
  - Please do not miss your face-to-face grading time! If you need to reschedule, do it at least a day in advance. No-show Policy: unless you have a documented excuse, 15% deduction from the max grade for that assignment.
  - Lateness policy: up to three days in the entire term
    Ensure you have submitted before your grading time slot
Announcements

- For future handins
  - DON’T upload unchanged files, esp. data files like armadillo.obj (15MB/per student!). This probably contributed to the disk space problem.
  - Remember: create subdirectories for part1 and part2 (and not a2)

Quiz 1 Preparation

- CAREFULLY review lecture notes, and assignment 1
- Textbook. Read all of these, except as noted. But use class notation (see L3 for differences).
  - Ch 1
  - Ch 2: skip Eq. 2.5
  - Ch 3: skip Section 3.6
  - Ch 4
  - Ch 5: skip Section 5.4
Quiz Format

- The Quiz is closed book, closed electronic device (laptops, phones, etc. should be out of sight).
- 50 marks (in 50 minutes. Please be on time!)
- Three types of questions
  - small questions (fill in the blank, many choices given)  
    “Can you recognize the concepts?”
  - direct questions (write down short answer)  
    “Do you understand the concepts?”
  - problem solving questions  
    “Can you use your knowledge in a new situation?”

The first two question types are meant to be easy. Try to go through them quickly, so that you have time to think about the problem solving questions at the end.

Some questions may have multiple parts that build on one another. Answer for part (a) is used in part (b), etc. Even if the answer for (a) is incorrect, you can get credit for later parts if you show your steps (i.e., later parts will be graded on the subsequent logic).
Quizzes will be scanned and returned electronically

Exercise:
Frames and Transformations

What are the coordinates of point P in frame A, B, and C?

Which frames are orthonormal?

\[
\overrightarrow{P} = \overrightarrow{A} \overrightarrow{P_A} = \overrightarrow{B} \overrightarrow{P_B} = \overrightarrow{C} \overrightarrow{P_C}
\]

Only A
Practice Homework

Come prepared with your answers for the next class

Frames in Graphics, continued

- Section 5.2 is very important, since it uses transformations in the most common ways in computer graphics, e.g., different versions of doMtoOwtA (see p. 46 of book). Make sure you understand this section.
Practice: GLSL

- What is the mandatory output in a vertex shader?
  a) `gl_Position`
  b) The color of each vertex (e.g. `fragColor` in the textbook example)
  c) The texture coordinates
  d) All of the above
Practice: Rotation

What kind of rotation is described by the matrix $\begin{bmatrix} c & 0 & s \\ 0 & 1 & 0 \\ -s & 0 & c \end{bmatrix}$?

(a) A rotation about the y axis  
(b) A rotation about the x axis  
(c) A rotation about the line $x + y + z = 1$  
(d) A rotation about the z axis  
(e) Not a rotation

Practice: 3D Rotation

- Which of the following is equivalent to a 90 degree rotation about the z axis $\begin{bmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$?

a) 90 degree about z, then -90 about y: 
\[
\begin{bmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}
\]

b) -90 degree about x, then -90 degree about y: 
\[
\begin{bmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}
\]

c) -90 degree about y, then -90 degree about x: 
\[
\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{bmatrix} \begin{bmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}
\]

d) None of the above
Practice: Homogeneous Coordinate

- Which of the following is a vector in 3D homogeneous coordinate?

\[
\begin{align*}
\text{a)} & \quad \begin{bmatrix} 0 \\ 3 \\ 3 \\ 3 \end{bmatrix} \\
\text{b)} & \quad \begin{bmatrix} 2 \\ 2 \\ 0 \\ 2 \end{bmatrix} \\
\text{c)} & \quad \begin{bmatrix} 4 \\ 0 \\ 0 \\ 0 \end{bmatrix} \\
\text{d)} & \quad \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}
\end{align*}
\]

Practice: Basis and Transformation

- What is the matrix that transforms a point from frame C to frame B?

\[
\begin{align*}
\text{a)} & \quad \begin{bmatrix} -1 & 0 & 0.5 \\ -1 & 1 & -3 \\ 0 & 0 & 1 \end{bmatrix} & \quad \text{d)} & \quad \begin{bmatrix} 0 & -1 & 0.5 \\ 1 & -1 & 3.5 \\ 0 & 0 & 1 \end{bmatrix} \\
\text{b)} & \quad \begin{bmatrix} 1 & -1 & 3.5 \\ 0 & -1 & 0.5 \\ 0 & 0 & 1 \end{bmatrix} \\
\text{c)} & \quad \begin{bmatrix} -1 & 1 & -3 \\ -1 & 0 & 0.5 \\ 0 & 0 & 1 \end{bmatrix}
\end{align*}
\]