

CPSC 314 Computer Graphics

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Quiz 1 prep, Frames

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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

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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)

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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

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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?”

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Quiz Format

- 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).

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Quizzes will be scanned and returned electronically

SAMPLE.
NOT OUR COURSE

THE UNIVERSITY OF BRITISH COLUMBIA
CPS 110: MIDTERM 2 Part B – November 13, 2013

Last Name: _____ First Name: _____

Signature: _____ UBC Student #: _____

Important notes about this examination

1. This exam has 2 separate parts. Part A is 25 minutes and Part B is 90 minutes.
2. This exam will be graded largely on how well you follow the design recipes. You have been given a copy of the Recipe Exam Sheet. Use it!
3. Put away books, papers, laptops, cell phones... everything but pens, pencils, erasers and this exam.
4. Good luck!

Student Conduct during Examinations

1. Each examination candidate must be prepared to produce, upon the request of the invigilator or examiner, his or her UBCcard for identification.
2. No questions will be answered in this exam. If you see text you feel is ambiguous, make a reasonable assumption, write it down, and proceed to answer the question.
3. No examination candidate shall be permitted to enter the examination room after the expiration of one-half hour from the scheduled starting time, or to leave

Please do not write in this space

Question 2: _____ Question 5: _____

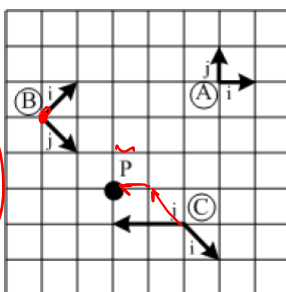
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Exercise: Frames and Transformations

So: $\bar{P}_a = \bar{B} \bar{P}_b$

$$= \begin{bmatrix} 1 & 1 & -5 \\ 1 & -1 & -1 \\ 0 & 1 & 1 \end{bmatrix} \begin{pmatrix} 0 \\ 2 \\ 1 \end{pmatrix}$$

$$= \begin{pmatrix} 0+2-5 \\ 0-2-1 \\ 0+0+1 \end{pmatrix} = \begin{pmatrix} -3 \\ -3 \\ 1 \end{pmatrix}$$



Bonus: What are coords of \tilde{P} in \tilde{a}

ie. $\tilde{P} = \tilde{a} \tilde{P}$

$$\bar{B} = \begin{bmatrix} 1 & 1 & -5 \\ 1 & -1 & -1 \\ 0 & 0 & 1 \end{bmatrix}$$

$\bar{P}_b =$

$$\begin{pmatrix} 0 \\ 2 \\ 1 \end{pmatrix}$$

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

Which frames are orthonormal? *Only A*

$$\tilde{P} = \tilde{a} \bar{P}_a = \tilde{b} \bar{P}_b = \tilde{c} \bar{P}_c$$

$$\bar{P}_a = \begin{pmatrix} -3 \\ -3 \\ 1 \end{pmatrix}$$

Practice Homework

Come prepared with your answers
for the next class

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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 `doMtoOwrtA` (see p. 46 of book). Make sure you understand this section.

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\mathbb{C}^3 : Vector Spaces

2014-01-13

Suppose \vec{e}_1, \vec{e}_2 form an orthonormal basis, and \vec{a}, \vec{b} are two orthogonal vectors with coordinates \vec{a}, \vec{b} in basis \vec{e} .

Consider these statements:

- ① $\vec{e}_1 \times \vec{e}_2 = 0$ $\vec{e}_1 \times \vec{e}_1 = 1$
- ② $\vec{e}_1 \cdot \vec{e}_2 = 0$ $\vec{e}_1 \cdot \vec{e}_1 = 1$
- ③ $(\vec{a})^T \vec{b} = 0$
- ④ $(\vec{a})^T \vec{b} = 1$

Choose the best:

- A : ① and ③
- B : ① and ④
- C : ② and ③
- D : ② and ④
- E : ②, ③ & ④

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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

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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:
- c) -90 degree about y, then -90 degree about x:

$$\begin{bmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{bmatrix} \begin{bmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

- b) -90 degree about x, then -90 degree about y:
- d) None of the above

$$\begin{bmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{bmatrix}$$

Practice: Homogeneous Coordinate

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

a) $\begin{bmatrix} 0 \\ 3 \\ 3 \\ 3 \end{bmatrix}$ b) $\begin{bmatrix} 2 \\ 2 \\ 0 \\ 2 \end{bmatrix}$ c) $\begin{bmatrix} 4 \\ 0 \\ 0 \\ 0 \end{bmatrix}$ d) $\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$

Practice: Basis and Transformation

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

a) $\begin{bmatrix} -1 & 0 & 0.5 \\ -1 & 1 & -3 \\ 0 & 0 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 0 & -1 & 0.5 \\ 1 & -1 & 3.5 \\ 0 & 0 & 1 \end{bmatrix}$

b) $\begin{bmatrix} 1 & -1 & 3.5 \\ 0 & -1 & 0.5 \\ 0 & 0 & 1 \end{bmatrix}$

c) $\begin{bmatrix} -1 & 1 & -3 \\ -1 & 0 & 0.5 \\ 0 & 0 & 1 \end{bmatrix}$

