CPSC 314
Computer Graphics

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Frames in Graphics

Announcements

- Quiz 1 handback now available.
- Assignment 2 available soon, possibly this weekend.
- Homework for today:
  - Read textbook Chapter 5

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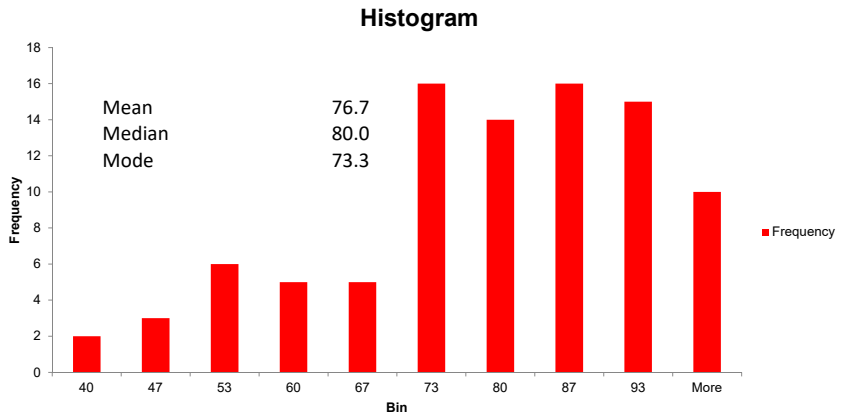
Quiz 1 stats



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Quiz 1 handback

- Scanned exam books are now available here
  https://www.ugrad.cs.ubc.ca/~cs314/handback/
  Login with your cs id
- Grades will be uploaded to Connect in a few days

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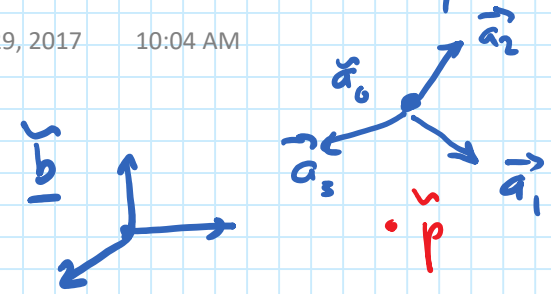
Frames in Graphics (Chap. 5)

September 29, 2017 10:04 AM



Basic Recipe

$$\underset{\sim}{p} = \underset{\sim}{b}\,\bar{p}_b = \underset{\sim}{c}\,\bar{p}_a = \underset{\sim}{b}\,\underline{A}\,\bar{p}_a$$

$$\underset{\sim}{b}\,\underline{A}$$

The point is the same, regardless of the frame

Convert coordinates into the same frame before you compute

Currency analogy of a frame

$\$25 = €20 = \$A\,20$

§ Classic frames in graphics

World fr $\underset{\sim}{w}$
synonym: Scene

Everything is defined w.r.t. $\underset{\sim}{w}$ (ultimate truth)

Object frame $\underset{\sim}{o}$
syn: model frame
← book's term

Fixed to an object. Positions are defined w.r.t. $\underset{\sim}{o}$

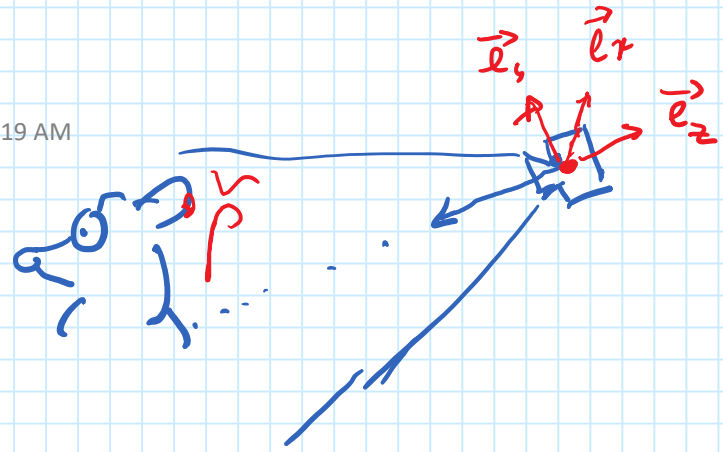
$$\underset{\sim}{o} = \underset{\sim}{w}\,\bar{o}$$

Eye frame $\underset{\sim}{e}$
or
View frame
or
Camera frame

Fixed to the eye/camera

Convention in graphics:
looking along $-z$
y-axis is "up"

$$\underset{\sim}{e} = \underset{\sim}{w}\,\underline{E}$$



When it is clear which frame we are using we'll simplify notation as follows

Matrix	4x1 column (point, vector)
O	p
E	v
Just caps	lower case

still use the decorations for frames, points, vectors

$$\vec{p} = \underline{o}\, p_o = \underline{w}\, O\, p_o$$ object coords.

$$\vec{p} = \underline{e}\, p_e = \underline{w}\, E\, p_e$$ eye-centered coords

So $$O\, p_o = E\, p_e$$

$$p_e = E^{-1} O\, p_o$$

E^{-1}: View Matrix; O: Model Matrix; together: Model View

How to transform object about an auxiliary frame

Read Sec. 5.2 of book

want to apply a transform about

$$\underline{\underline{m}} = \underline{\underline{w}}\, M$$

$$p = \underline{\underline{m}}\, p_m \text{ , convert to world frame and then back}$$

To be continued....