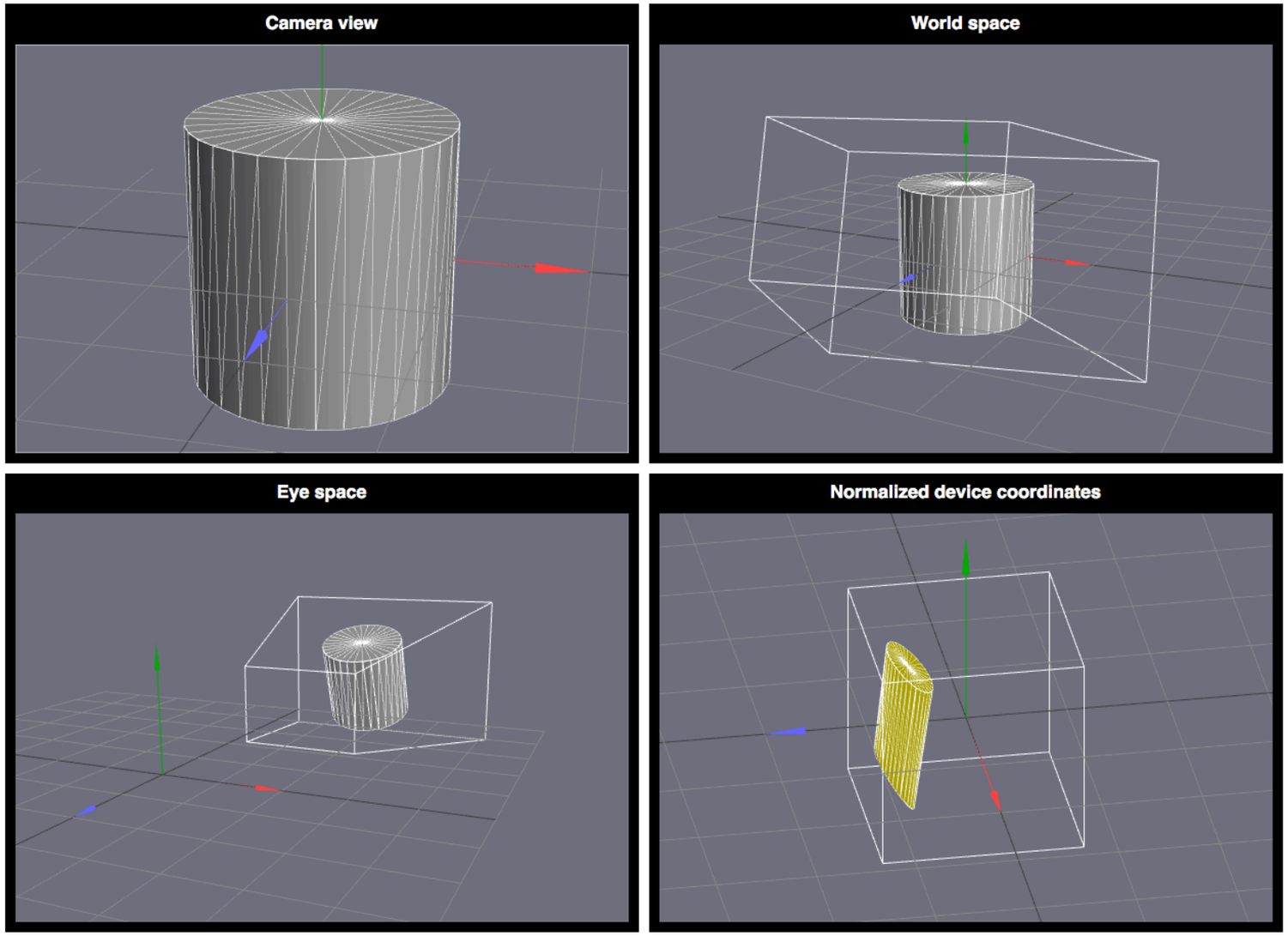


Computer Graphics

Lecture 15

Viewing Transformations

Announcements

Announcements

A tentative plan:

Announcements

A tentative plan:

- HW2 out Monday 2/10, due Tuesday 2/18

Announcements

A tentative plan:

- HW2 out Monday 2/10, due Tuesday 2/18
- A3 out Friday 2/14, due Friday 2/28

Announcements

A tentative plan:

- HW2 out Monday 2/10, due Tuesday 2/18
- A3 out Friday 2/14, due Friday 2/28
- FP proposals due Friday 2/21, back Monday

Announcements

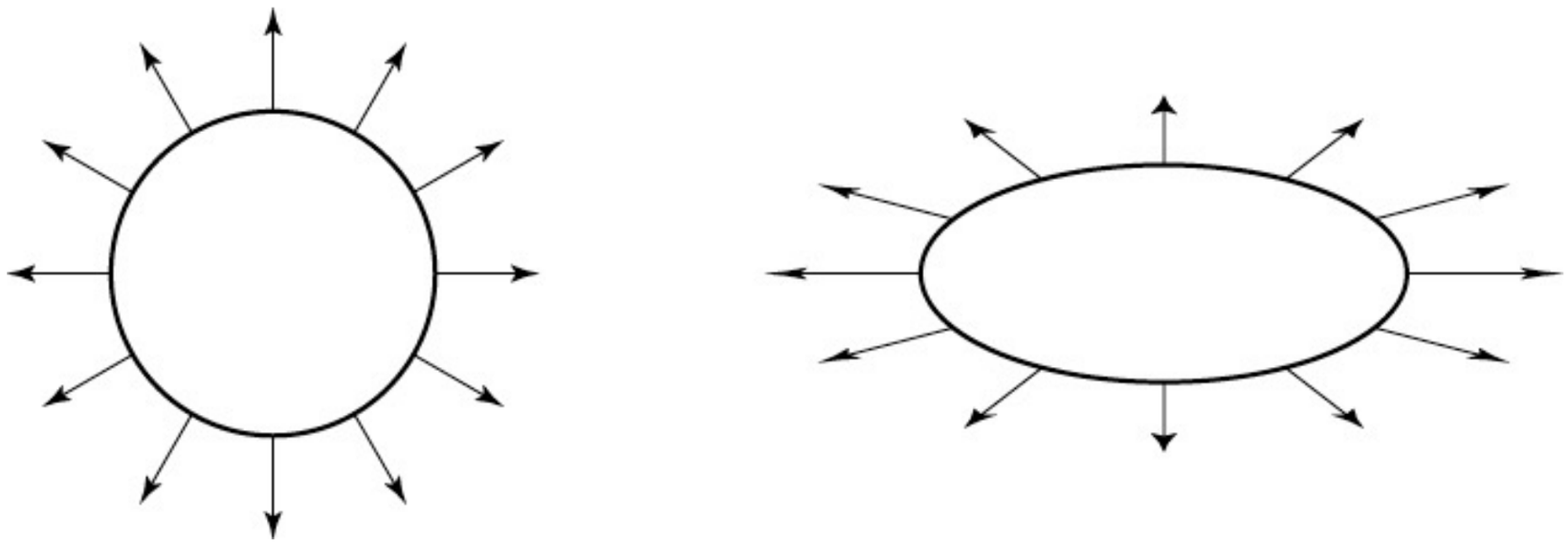
A tentative plan:

- HW2 out Monday 2/10, due Tuesday 2/18
- A3 out Friday 2/14, due Friday 2/28
- FP proposals due Friday 2/21, back Monday
- Takehome Midterm out Friday 2/21, due Monday

Transformations and Normals

Transforming normal vectors

- Transforming surface normals
  - –differences of points (and therefore tangents) transform OK
  - –normals do not --> use inverse transpose matrix



have: $\mathbf{t} \cdot \mathbf{n} = \mathbf{t}^T \mathbf{n} = 0$

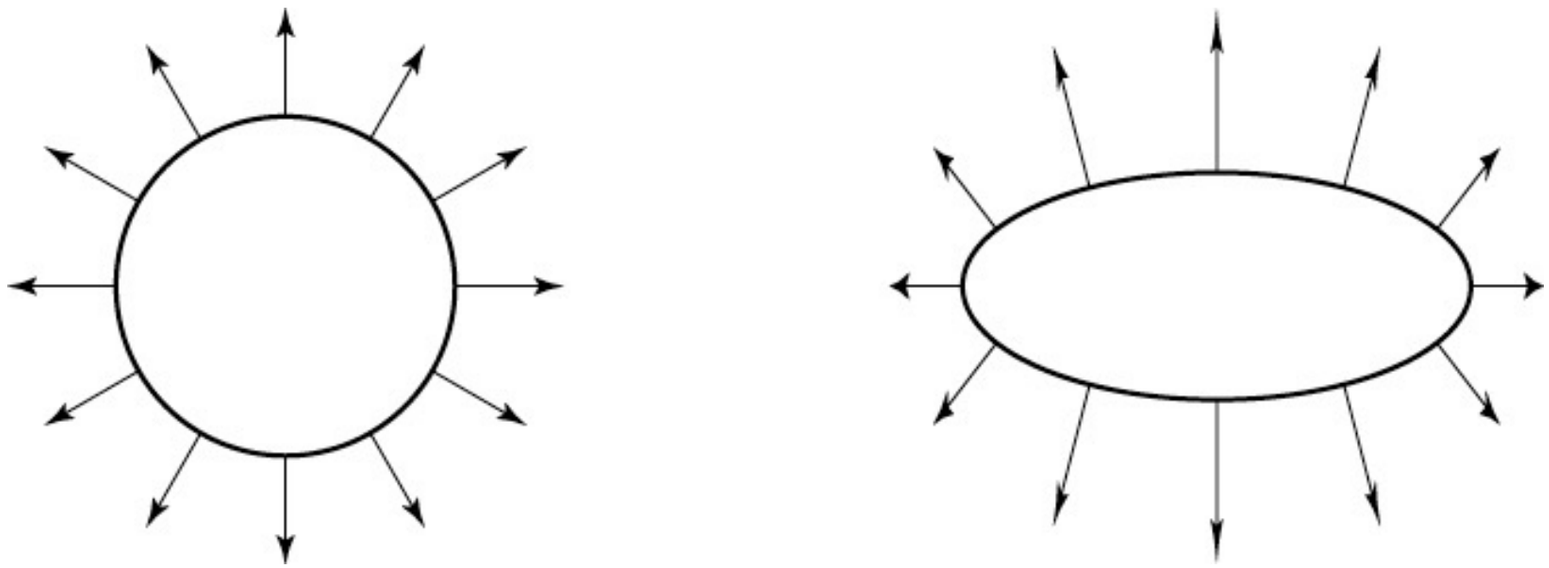
want: $M\mathbf{t} \cdot X\mathbf{n} = \mathbf{t}^T M^T X \mathbf{n} = 0$

so set $X = (M^T)^{-1}$

then: $M\mathbf{t} \cdot X\mathbf{n} = \mathbf{t}^T M^T (M^T)^{-1} \mathbf{n} = \mathbf{t}^T \mathbf{n} = 0$

Transforming normal vectors

- Transforming surface normals
  - –differences of points (and therefore tangents) transform OK
  - –normals do not --> use inverse transpose matrix



have: $\mathbf{t} \cdot \mathbf{n} = \mathbf{t}^T \mathbf{n} = 0$

want: $M\mathbf{t} \cdot X\mathbf{n} = \mathbf{t}^T M^T X \mathbf{n} = 0$

so set $X = (M^T)^{-1}$

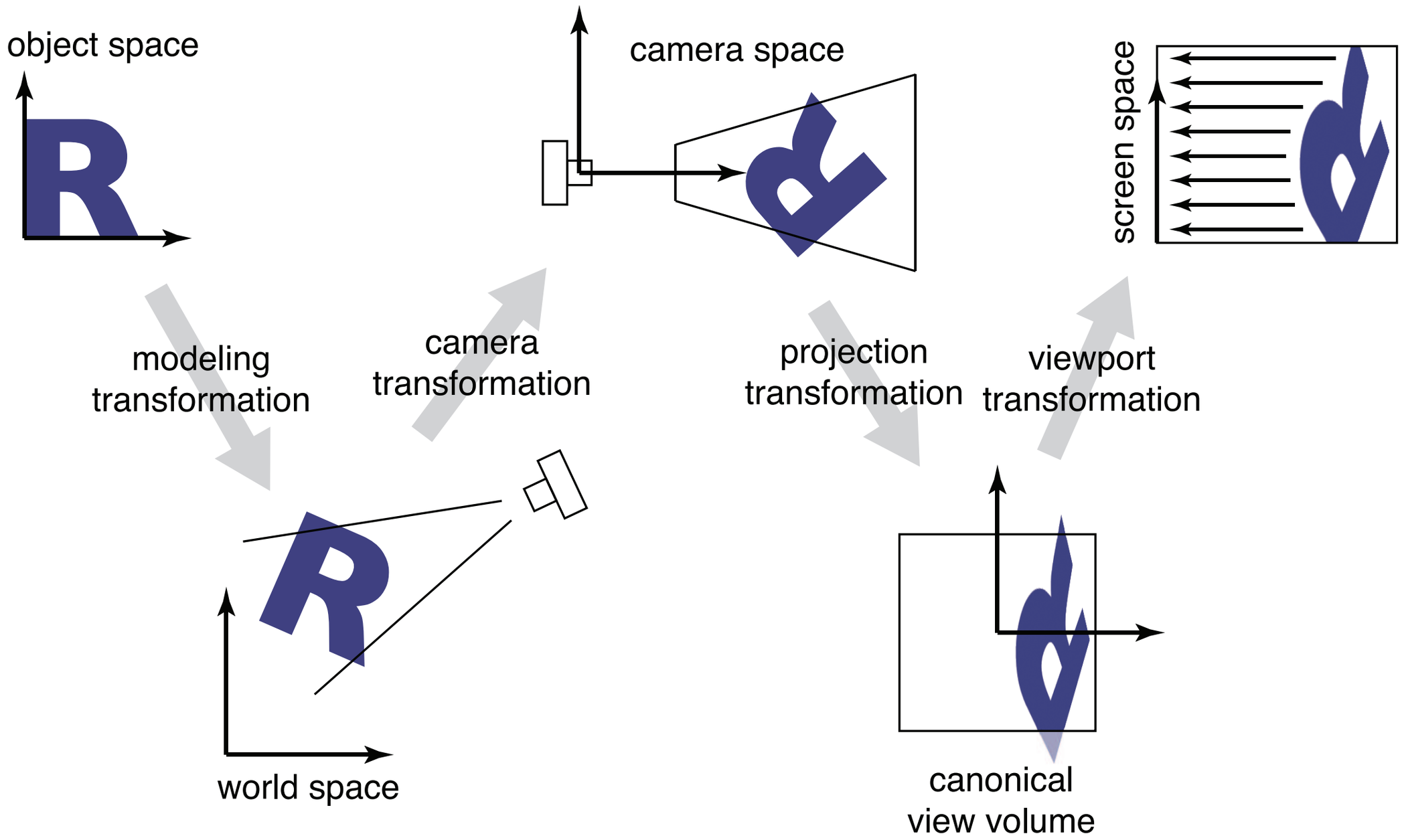
then: $M\mathbf{t} \cdot X\mathbf{n} = \mathbf{t}^T M^T (M^T)^{-1} \mathbf{n} = \mathbf{t}^T \mathbf{n} = 0$

Viewing Transformations

A standard sequence of transforms to go from
object (model) space to **screen (image) space**

Viewing Transformations

A standard sequence of transforms to go from
object (model) space to **screen (image) space**



Model Transform

- From "object space" to "world space"
- Or: change from "object basis" to "world basis"

Model Transform

- From "object space" to "world space"
- **Exercise**: design a model matrix to create a **skyscraper** out of a cube.
  - A1 cube mesh - side length 2, centered at origin
  - Skyscraper has:
    - (-1, -1, -1) in object space is at (4, 0, 3)
    - World space dimensions are (0.3, 0.08, 0.25)