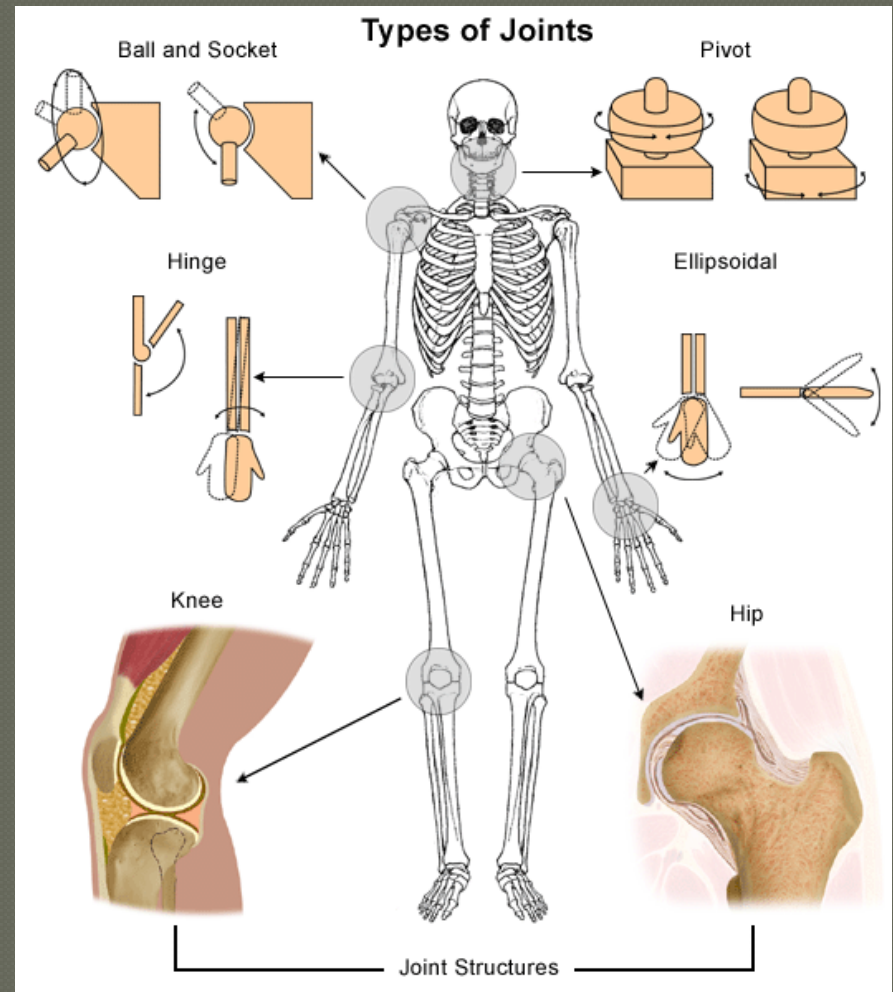


Fencing Woman: Articulations and Framing in VPython

Math 198
Katie Bora

Defining Articulations

- Articulations is another term for joints
 - Anywhere where bones meet and connect
- Provide support and movement

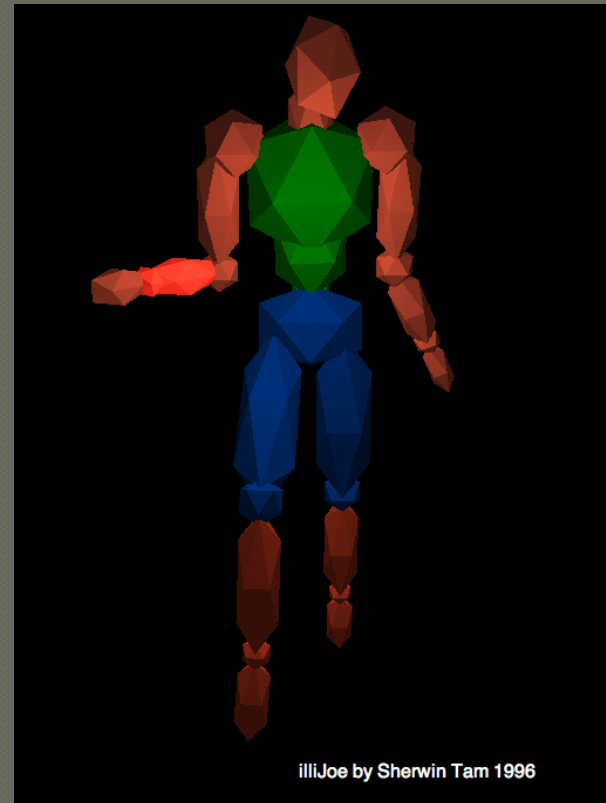
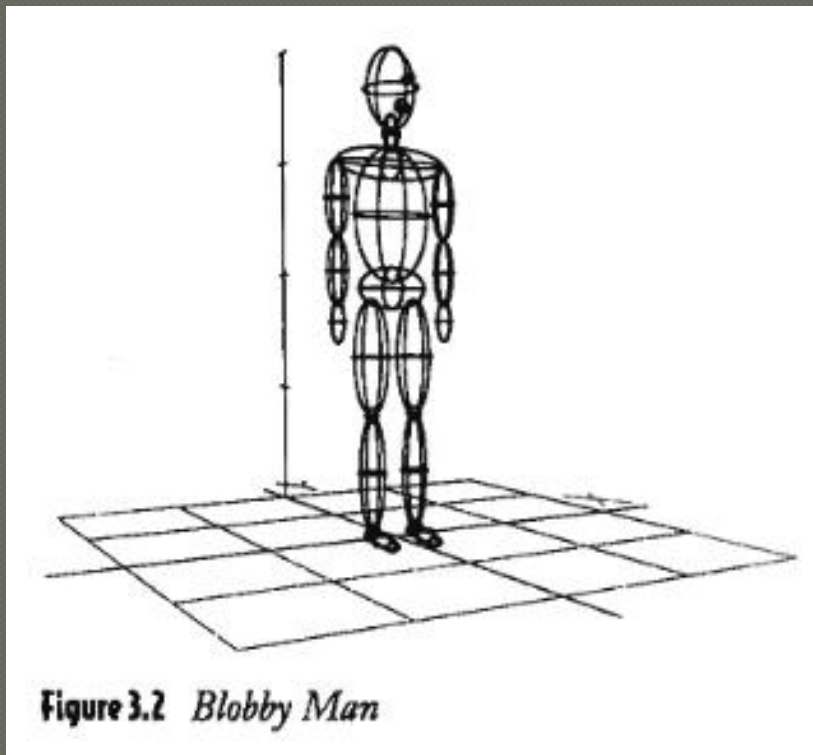


Articulations in Computer Graphics

- ◉ If we create a body using computer graphics, how can we animate it?
- ◉ Framing, and an understanding of articulations in the human body.

Blobby Man

- Created during the 1980's by Jim Blinn



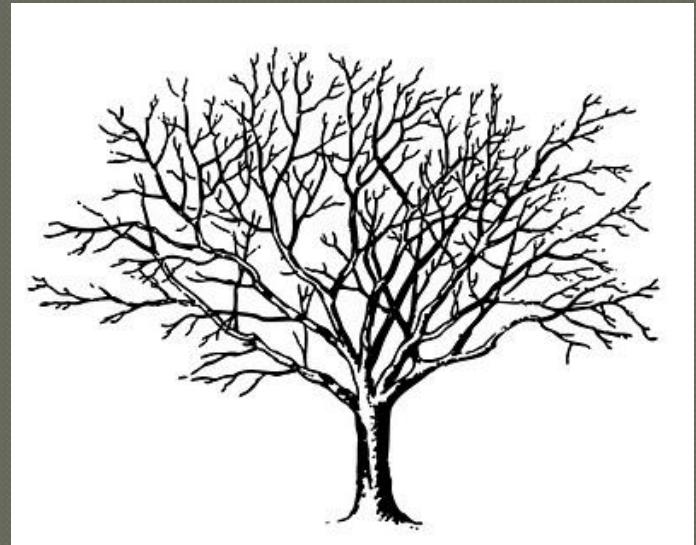
http://new.math.uiuc.edu/public198/an_index.h

Nested Transformations

- ◉ Hierarchy when working with accumulated transformations
- ◉ Top-down.
 - Think of it in reverse order

Frames

- ◉ Frames is a grouping method in Vpython.
- ◉ It is a hierarchical arrangement based on a parent frame.
- ◉ The location of other frames is dependent on the parent frame



<http://thegraphicsfairy.com/vintage-halloween-clip-art-spooky-trees/>

Frames

- ◉ Within each frame you can place objects.
- ◉ These objects position is based on the frame and are dependent on the frame
- ◉ When the frame is moved, all the objects in the frame are moved.

Frames Examples

```
fheart=frame()
```

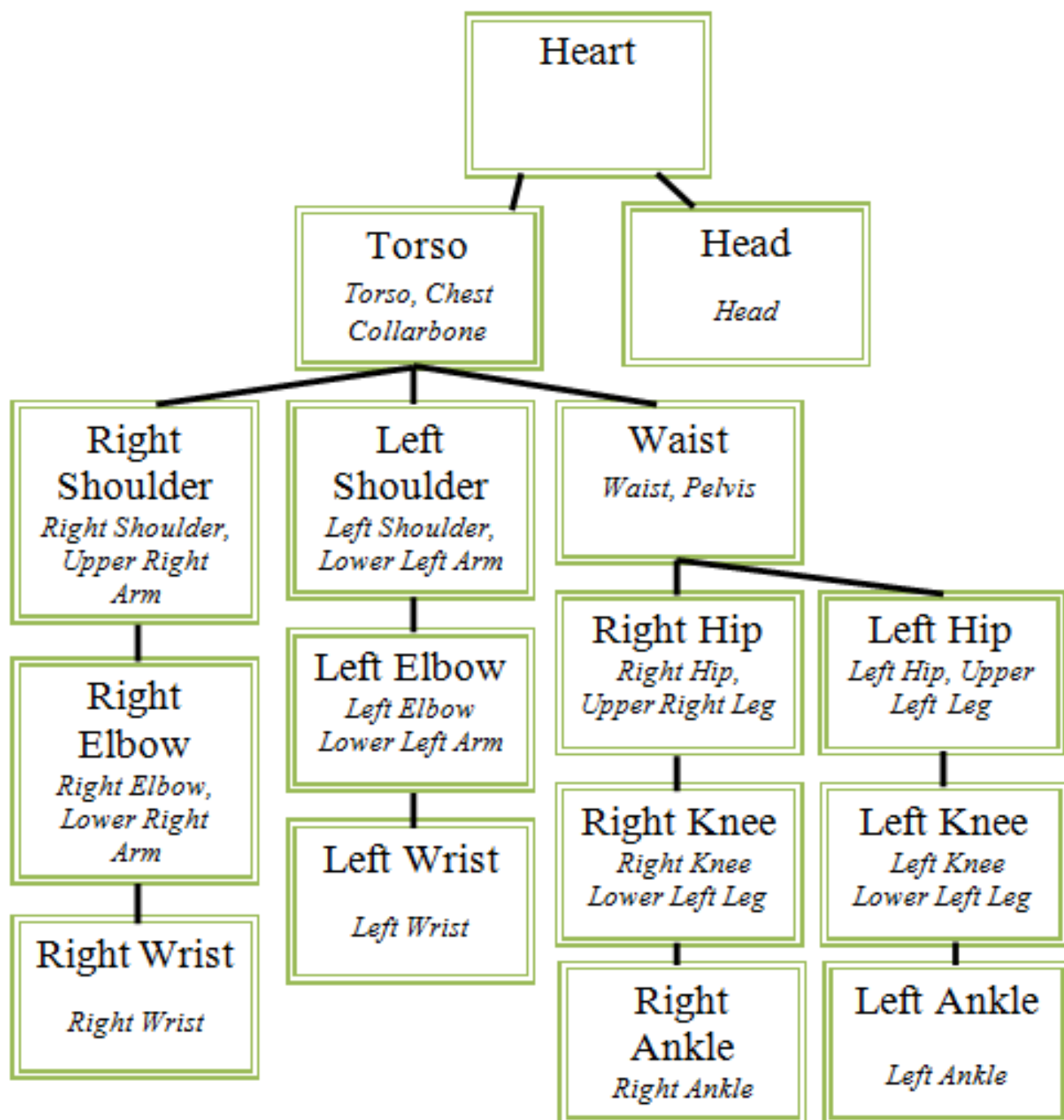
```
fhead=frame(frame=fheart, pos=(0, 1.75, 0))
```

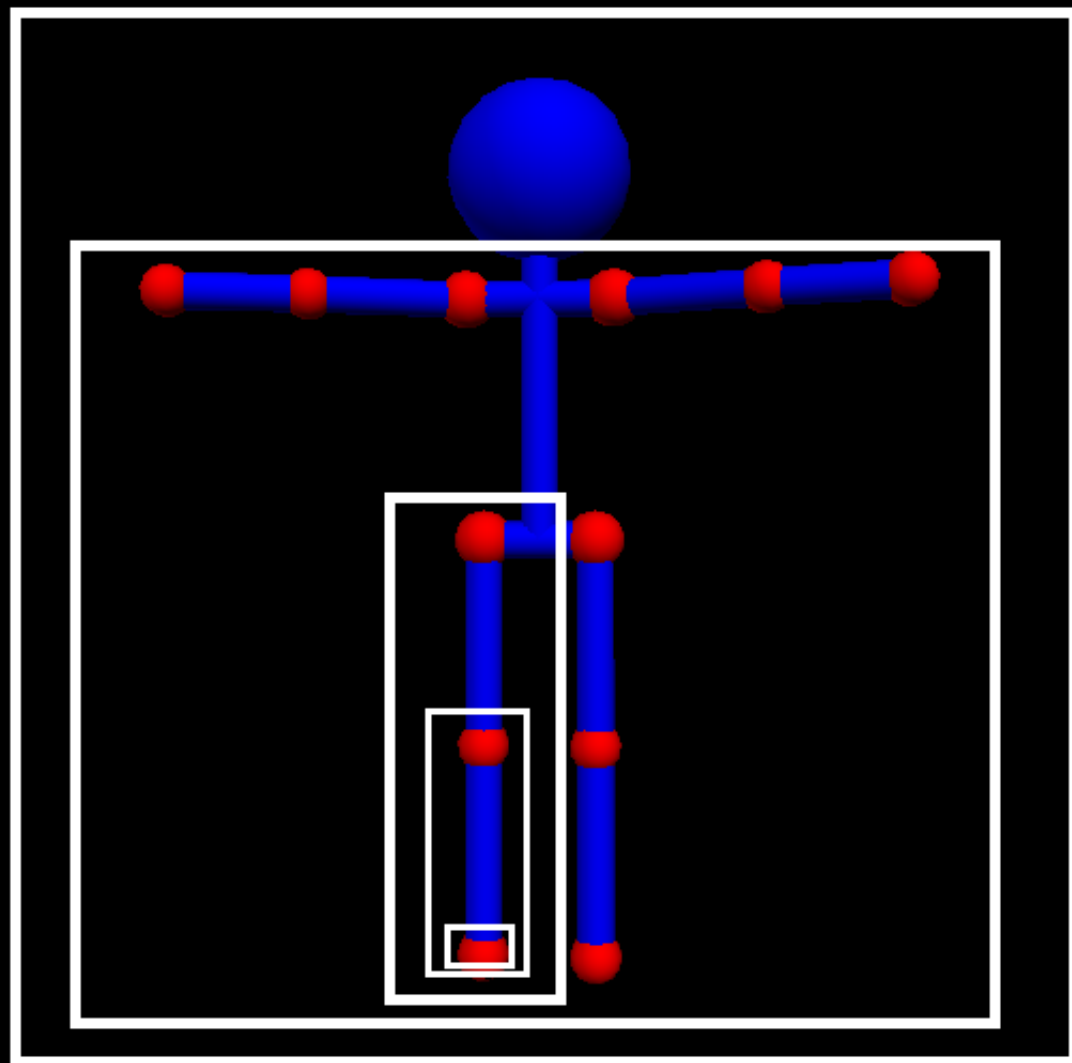
```
ftorso=frame(frame=fheart, pos=(0, .75, 0))
```

```
fwaist=frame(frame=ftorso, pos=(0, 2.5, 0))
```


Objects within the Frames

```
head=sphere(frame=fhead, pos=(0,0,0), radius=1.25,  
            color=color.blue)  
chest=cylinder(frame=ftorso, pos=(0,0,0),  
              axis=(0,-2.5,0), radius=0.25, color=color.blue)  
collarboneL=cylinder(frame=ftorso, pos=(-1,-  
              .75,0), axis=(2,0,0), radius=0.25,  
              color=color.blue)  
waist=cylinder(frame=fwaist, pos=(0,0,0),  
              axis=(0,-1.5,0), radius=0.25, color=color.blue)  
pelvis=cylinder(frame=fwaist, pos=(-.75,-1.5,0),  
              axis=(1.5,0,0), radius=0.25, color=color.blue)
```





Frames and Articulations

- ◉ Frames are often joints, and by moving the frames, you move everything within the frame, including other frames and objects.

```
fshoulderL=frame(frame=ftorso, pos=(-1,  
    .75, 0))
```

```
fshoulderL.rotate(angle=3*pi/2,  
    axis=(1.5, 1.5, 1.5))
```

- ⦿ Continuous motion by adding time and a range

My Project

- Using the frames and articulations, I am going to create a visual demonstration of the fencing move, the Advance Lunge.

Fencing Background

- ◉ Member of the Fencing Illini
- ◉ Member at the Point Fencing Club in Champaign
- ◉ Compete collegiately and through USFA



Basics of Fencing

- ◉ En Garde
- ◉ Advance
- ◉ Extend
- ◉ Lunge
- ◉ Retreat

Engarde

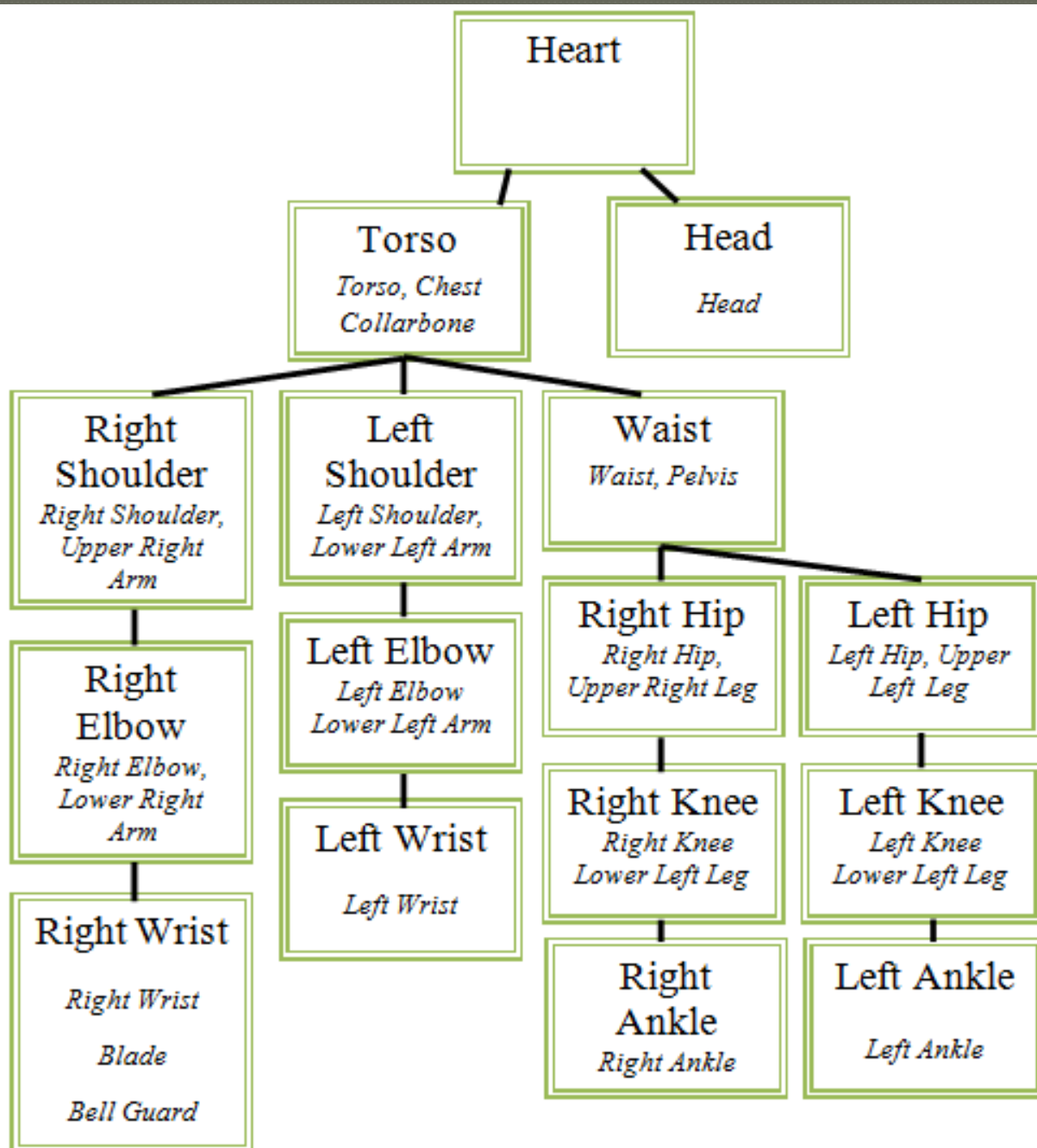


Lunge



Advance Lunge





References

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- Hovey, Sarah. (2010). *Work Out Guy: The Complete Exercise Routine*. University of Illinois Urbana-Champaign: MATH 198.
- <http://en.wikipedia.org/wiki/Joint>
- http://www.cumc.columbia.edu/dept/rehab/musculoskeletal_health/anatomy.html