# CPSC 314   Assignment 2 – Coding

Due 23:59:59 on February 10, 2017,

1. (20 points) Coding with Transformations

   Your task will be to create and animate a model of a horse. The main goal of the assignment is to practice rotation, translation, and scaling transformations, as well as transformation hierarchies. You will also gain a basic understanding about character posing and animation.

   Be as creative and ambitious as you like. The best work will be posted on the course web site in the Hall of Fame and shown in class.
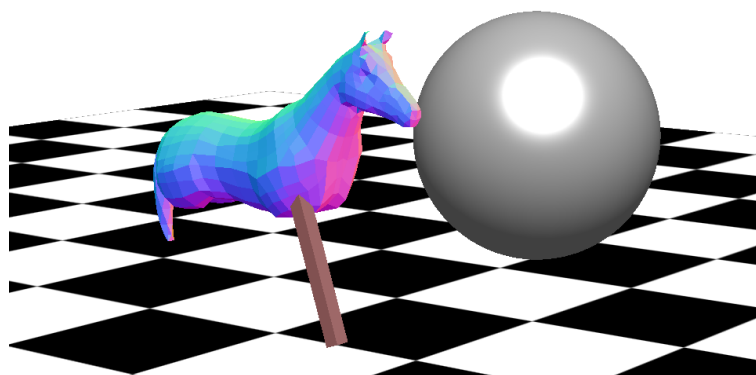
   Important Rules:
   As illustrated in the template code, you are allowed to use some of the basic matrix support functions provided by `Three.js`. This includes: `Matrix4.multiply()`, `Matrix4.makeTranslation()`, `Matrix4.makeRotationX()`, `Matrix4.makeRotationY()`, `Matrix4.makeRotationZ()`, `Matrix4.makeScale()`.

   `Three.js` provides tools which allow for easy rotation, translation, and scaling of objects with respect to their parent coordinate frames. However, for this assignment, you should not use parenting. By default, all objects will have the world coordinate frame as their parent. You should not use the Translate, Rotate, and Scale functions that are methods which are directly associated with objects. Instead, you will be directly modifying the 4×4 modeling transformation associated with each object, i.e., obj.matrix, where 'obj' is the object in question. This matrix should take points to the world coordinate frame.

   Please see the template code for examples.

   Requirements:

   (a) (4 points) Add legs to the horse. Each leg should have at least two links, and probably more. Look online to understand more about the true skeletal structure of a horses legs. You can construct the legs out of boxes, cylinders, or any other available geometric primitives. See the template code for a simple example, and the documentation available at `threejs.org` for more primitive types.

   (b) (8 points) Animate the horse. Each link will change its orientation with respect to its parent. The template code creates animation using a simple sinusoid, but you

should feel free to do something more sophisticated as necessary, for example to allow for global translation of the horse. Hitting the '3' key should reset and restart the animation.

(c) (3 points) Add poses. Produce 3 interesting static poses for the horse, which should be displayed when the keys '0', '1', or '2' are pressed.

(d) (5 points) Make further creative additions. Features to explore include:

- Make a controllable animation, i.e., one that can jump on command, via a keystroke.
- Experiment with other scene elements, materials, environment maps, and other features that can be seen in various `three.js` examples on `threejs.org`. Bonus marks may be given at the discretion of the marker for noteworthy explorations.
- Build an interesting scene or animation.
- Add a rider to the horse.

To hand in:

- Hand in a README.txt file. This should include your name, student number, and user name, as well as any information you wish to pass along to the marker. List any external resources (web pages, books, consultation with others) that you used. This assignment is to be completed individually. Comment on your implemented features and keybindings in your README file.

- To hand in, create a `cs314` subdirectory under your home directory, and create an `a2` subdirectory underneath that. Copy all the files that you wish to hand in to this directory. The assignment can be handed in using `handin cs314 a2`.

- Demonstrate your code to a TA in the lab, or at another to-be-arranged time.

We look forward to showing off the creative results from this assignment in class!