Tutorial: Cluster Making

Grab the latest from github.

In the Tutorial 20 directory, there will be a file `cluster_making.pro`. Run that, then make some of your own clusters.

First, run the `test_` programs to see what some of the code does. Note that these test codes use the `plot` function, which is a different sort of plotting tool than the `plot` procedure you're used to, but takes most of the same arguments.

`test_randomxyz` will generate sets of random initial positions and plot them.

`test_cluster_making` plots the distribution functions: the PDF, the CDF, and the quantile function (the inverse-CDF).

Compute a set of random masses, `masses = random_masses(100)`, and plot them in a histogram:
`masshist = histogram(masses, nbins=20, location=massvals)`
`plot,massvals,masshist,psym=10`
Try this also with *log of the masses*:
`logmasshist = histogram(alog10(masses), nbins=20, location=logmassvals)`
What is the X-axis showing? Which plot approach makes more sense? (answer these questions as a comment, but ask if you don't know)

Make random radii and random speeds:

```
xyz_positions = random_xyz(100,3)
help,xyz_positions ; so that you can see what "shape" the array has
; then we sum the square of these points to get the length of the hypotenuse
; This is just a clever one-liner way to turn x-y-z position into the length of
; the vector
radii = total(xyz_positions^2,2)^0.5
; use the masses and radii to get speeds
speeds = star_speeds(masses, radii)
```

Plot their histograms as well, and also plot speeds against radii.

```
speedhist = histogram(speeds, nbins=20, location=speedvals)
plot,speedvals,speedhist,psym=10
radiihist = histogram(radii, nbins=20, location=radiivals)
plot,radiivals,radiihist,psym=10
plot,radii,speeds,psym=1
```

These exercises should give you an idea of how to use the functions you'll need on your homework.