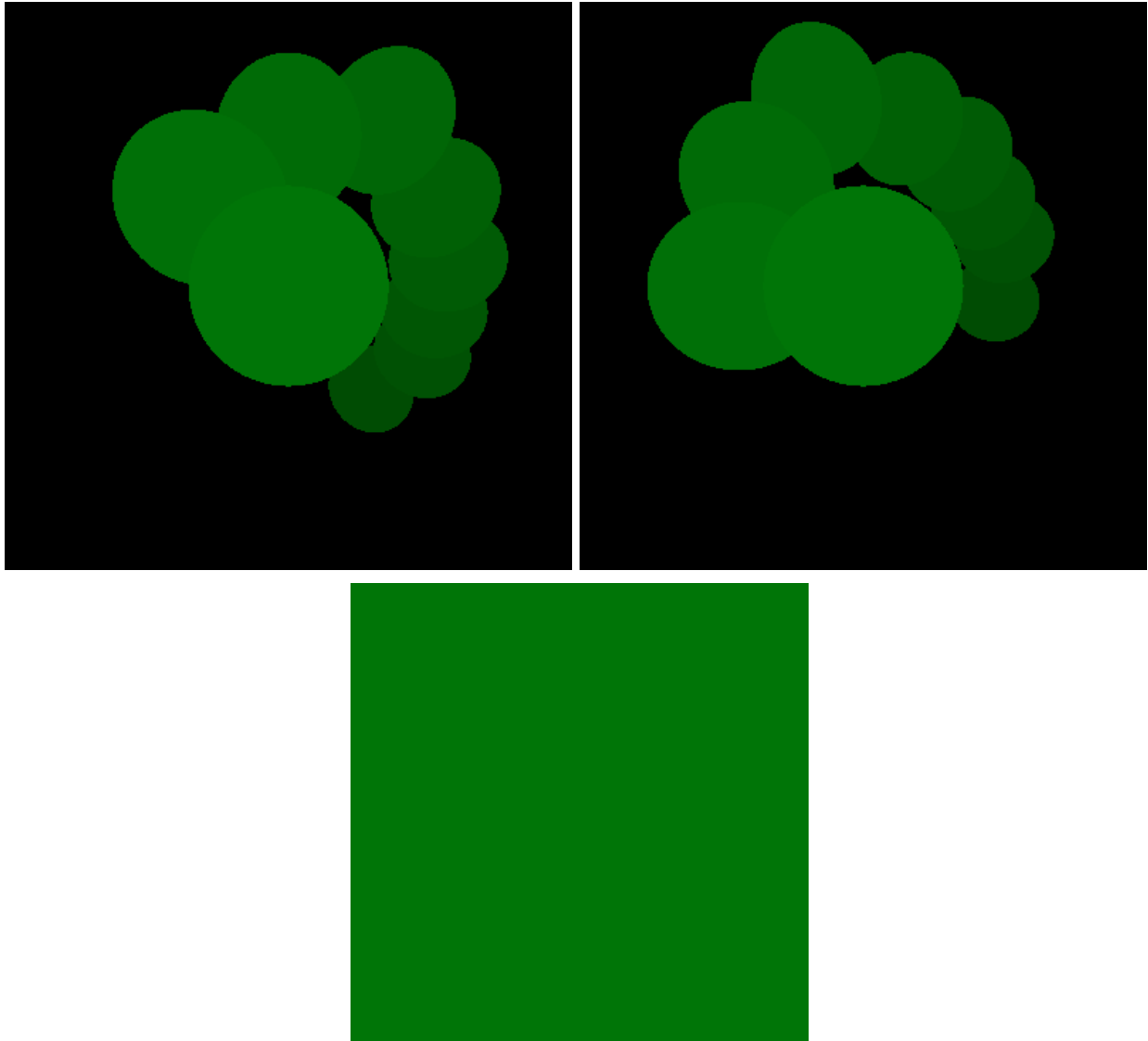


Up Vector

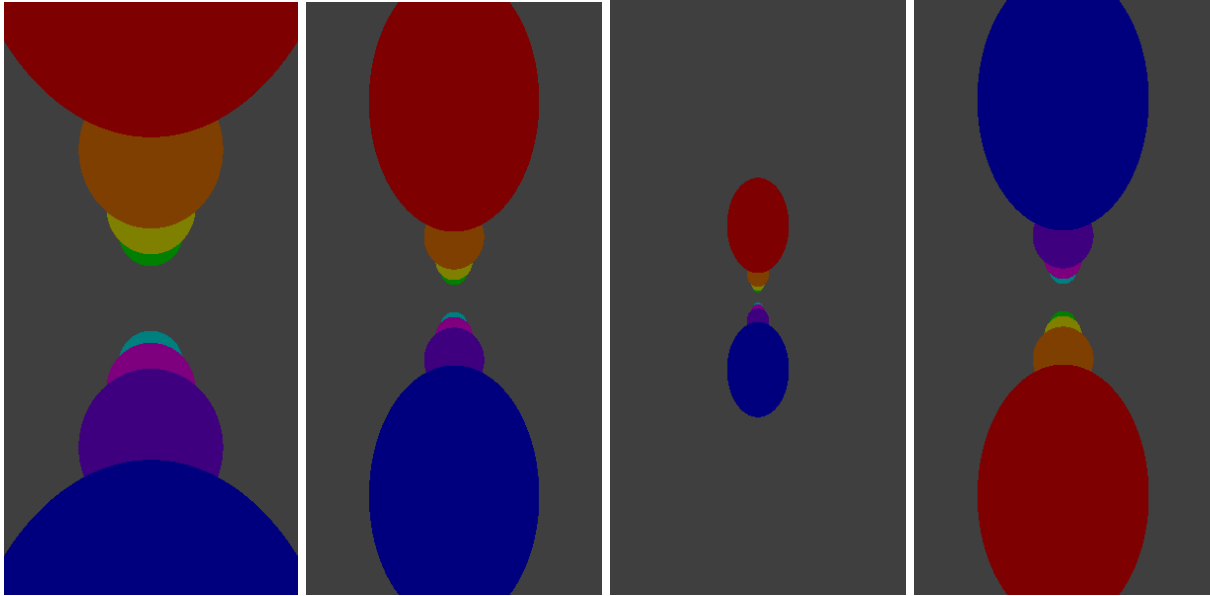


To start out, I have an image of 9 green spheres spiraling into the distance.

The input file for this image uses the canonical view, so updir is $\langle 0, 1, 0 \rangle$. This can be changed to $\langle 1, 1, 0 \rangle$ in order to "roll" the camera left by 45 degrees, as in the second image.

One interesting distinction is that, since the horizontal direction of the viewing plane is calculated by taking the cross of viewdir and updir, this direction is undefined if viewdir and updir are colinear. In such a case, my program returns the third image.

Field of View



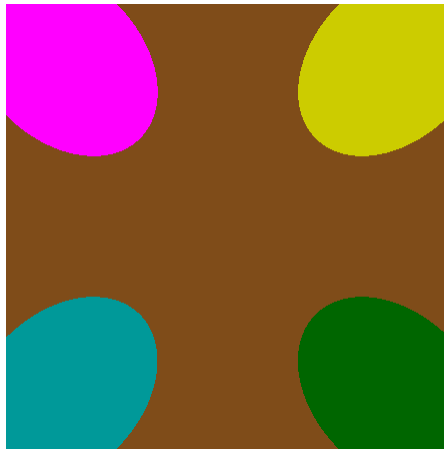
These images show an image of colored spheres going further away from the viewer with fovh settings of 45, 90, 140, and 270 degrees.

While bounded between 0 and 180 degrees, it's easy to see how the horizontal field of view simply dictates how many degrees the viewer can see from side to side, but as different values are explored, the results can be interesting.

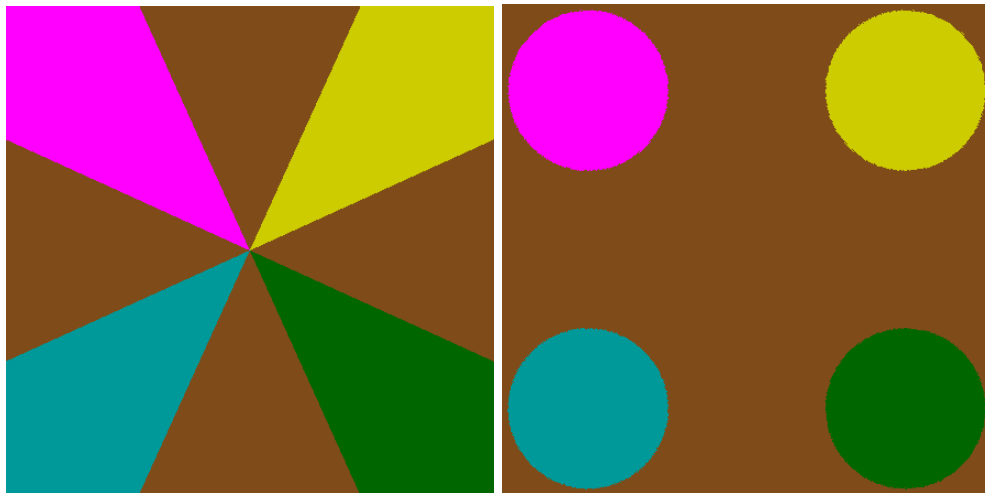
For one, the 270 degree image has had its colors flipped, owing to the periodic nature of the trigonometric tangent function used on the field of view. From fovh 180 to 360 degrees, the calculation of the image sizes introduces a negative number into the viewing window width and height, which causes the image to be flipped both horizontally and diagonally.

Another special case is at 0 and 180 degrees, at which point the image becomes only the background color.

Changing Apparent Perspective Distortion



Perspective distortion in the result image of the raytracer is unavoidable, but it is possible to lessen it, or enhance it, if desired.



The first image on the page is a file with a 90 degree horizontal field of view and a distance of 3 between the eye and the objects. As is to be expected, the spheres distort a little bit around the edges of the image.

I achieved the effect in the second very distorted image by going to the high extreme of fovh and the low extreme of distance, with 180 degrees and .1, respectively. Previously I had thought of 180 degree fovh images as empty, but in fact the objects were just too far away to be seen.

The third image looks like 4 very circular circles; this was done by the opposite of the last method, 1 degree fovh and 353 distance. This image is akin to what would have been produced by a parallel projection, with an "infinitely far" viewpoint.