Solutions

CS 240: Computer Graphics
Handout 5: November 2, 2016

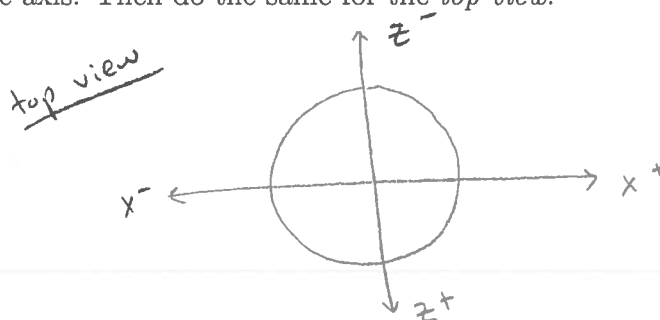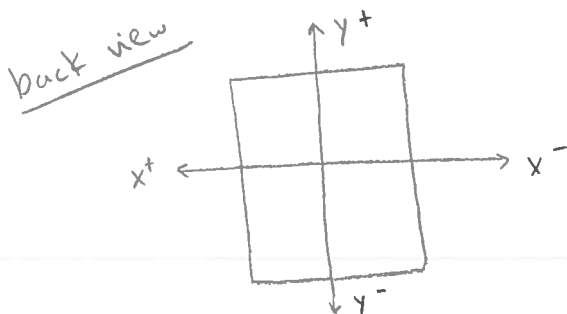*Projection Practice Problems*

1. **Orthographic projection:** Imagine a cylinder centered at the origin, with the circular faces lying on the planes $y = -2$ and $y = 2$. Draw the *back view* of an orthographic projection of this cylinder, labeling the positive and negative axis. Then do the same for the *top view*.

2. **Perspective projection:** Given the following 8 vertices of a cube in world space, find the corresponding coordinates of each in viewport space, using a perspective camera at the origin with the viewport at $z = -1$. Then draw what the "viewer" would see.

world coordinates	viewport coordinates
$P_1 = (-2,1,-1)$	$(-2,1)$
$P_2 = (-1,1,-1)$	$(-1,1)$
$P_3 = (-1,2,-1)$	$(-1,2)$
$P_4 = (-2,2,-1)$	$(-2,2)$
$P_5 = (-2,1,-2)$	$(-1,1/2)$
$P_6 = (-1,1,-2)$	$(-1/2,1/2)$
$P_7 = (-1,2,-2)$	$(-1/2,1)$
$P_8 = (-2,2,-2)$	$(-1,1)$
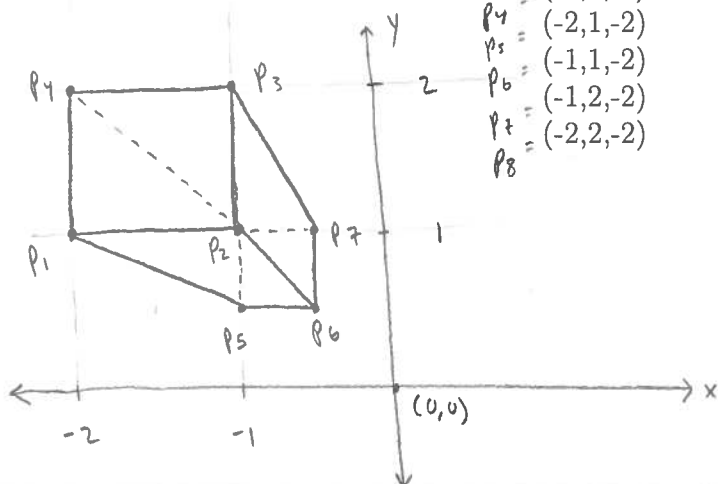
3. **3D transformations:** You are given a cube centered at $(0,0,-5)$, with a perspective camera at the origin and a viewport at $z = -1$. The cube's faces are colored as follows. Front: blue, right: black, back: white, left: green, top: yellow, bottom: red. The line below is added right before the cube is drawn:

```
cube.rotation.x = 0.5;
```


What colors are visible? What colors are visible if we then added:

```
cube.rotation.y = -0.5;
```