

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 |
|-------------------|----------------------|
| (-2,1,-1) | |
| (-1,1,-1) | |
| (-1,2,-1) | |
| (-2,2,-1) | |
| (-2,1,-2) | |
| (-1,1,-2) | |
| (-1,2,-2) | |
| (-2,2,-2) | |

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;
```