**Exercises 4**

1. *What are lens effects and why are they used?*

Lens effects are a replication of the effects that proper light has on physical cameras, such as lens flare and bloom. However accessories such as lens hoods and anti-reflective coatings have lessened these lens effects in actual cinematography. They can be used to provide a more striking, cinematic feel to a scene.

* 1. *Describe the RGB cube and where the different colours are located.*

The RGB cube is a 3D representation of colour, where each axis of the cube represents a different RGB channel, or colour. For example, where x = R, y = G and z = B, the origin (0,0,0) will be the RGB value (0,0,0), or black. On the opposite corner of the cube, the point at RGB value (255,255,255) will be white, and so forth.

* 1. *What is the geometric relation between the RGB cube and the HSI hexcone?*

Geometrically, each of the six vertices on the base of the HSI hexcone, representing the chromatic values, corresponds to a point on the cube. For the monochromatic values, the appear on opposite ends in both models – black is the point of the cone and white is the centre of the base, whereas wherever white lies on the RGB cube, black is the furthest vertex from that point.

1. What is the CIE Chromaticity diagram?
2. Let a surface be coated with cyan and yellow colours and illuminate it with white light.
   1. What colours are reflected?
   2. What colours are absorbed?
3. For the following display systems:
   * + 36x20 cm screen with 1920x1080 resolution viewed at distance 50cm.
     + Resolution of 2000x2000 projected onto hemi-spherical dome
     + Head-tracked stereoscopic HMD with horizontal field view of 110 degrees. Two screens are used, 1920x1080 for each eye.
4. Calculate the average horizontal angular pixel density.
5. Which has the highest perceived resolution, with regards to the tradeoff between FOV and angular resolution?
6. Which has the highest FOV and FOR? Discuss the advantages of high levels of both.
7. Which would be best for displaying the following:
   1. Word processing
   2. A 360 photo viewer
   3. A driving simulator
   4. A game where enemies approach from every direction
8. When wearing a HMD with head tracking, the user fixates on objects fixed in relation to the real world. To achieve this, the displayed image moves counter to the head movement. What effect does this have on perceived resolution?