Free Question: What is optical engineering?
- It capitalizes on the science of light by meeting the market demand.

0. Which optical device is demanded the most by the market?
- I guessed glasses but then he said, “look around you which optical device do you see the most often?” Then I realized it is the camera because of the shear number of cellphones sold every year. He asked me to estimate the number of cameras sold per year and so on.

1. In class we talked about some optical systems. Is there one you would like to talk about?
- Human eye

2. Draw me a diagram of the eye
- drew parts relevant to optics

3. What is the optical power of the eye?
- Focal length in water 24 mm, in air 24mm/1.3 ~ 17 mm, D = 1000/17 ~ 60 dp

4. What are the spectacles used for?
- To Fix a combination of cylindrical aberrations, myopia, hyperopia

5. What happens as you age?
- Accommodation of the eye starts getting worse (drew a sketch of delta D vs age)

6. What does an accommodation of 2 dp correspond to?
- The near point is at 0.5 m

7. Why does that 2dp start becoming a problem?
- At 2 dp with .5m, you need longer arms to read

8. Have you heard of progressive glasses?
- No, but I can try to guess how they work

9. Progressive glasses enable you to read and say to drive with the same glasses on. How can that be possible?
- I struggled here, he started guiding me towards the answer by asking the differences in the viewing angles when reading and driving (you look down while reading but straight while driving) Therefore the power of the lens changes “progressively” from bottom to say the center. You use the middle part to look at distant objects and bottom part to read.

10. In class I talked about bifocal intraocular lenses. Do you remember? (I didn’t). You can have two different focal points for viewing far and near objects. How did I achieve that?
- I struggled here, he made me draw a ray diagram and then I realized he must have used diffraction (different diffraction orders converge to different focal points) which turned out to be true.

11. What are the problems with this approach?

- Chromatic aberration as different colors get diffracted at different angles

12. No but assume it is near the optical axis so the color doesn't matter. What else?
- Took some time to think and then he basically explained that you see the same image overlapped except one is blurred

13. So what happens to the contrast?
- It goes down. Contrast is (Imax – Imin)/(Imax + Imin)

14. I would say it goes down by 2 (I think he actually wanted to ask me numerically how much the contrast would go down). Ok let's end the exam here and give us some time

Generally, it was very relaxed and felt more like a casual discussion. I had a couple of "aha!" moments. During the exam, he leads you to think like the inventor who tries to solve real world problems. Extremely interesting person to talk to and take this opportunity to learn from him. Best of luck!