Physics 256 Assignment 8
Due: Wednesday, November 14th, 2012 4:00 pm in the drop box in Physics or electronically 89 marks

1) Magnification thin lens in air: 5.26. **Distance between the object and screen image is 60 cm, image real, image can be upright or inverted. 6 marks**

2) Longitudinal magnification: A camera lens has an f=50mm focal length lens and is focused 2 m in front of the lens. That is, an object at 2 m is sharply focussed on the film plane.
a) What is the lateral magnification for this lens? **4 marks**

b) If a boy 1.5 m in height stands at 2 m looking towards the camera, how tall is his image? **2 marks**

c) If the boy is holding a 1 m hockey stick out horizontally in front of him, how long will the image be? The hockey stick is straight out in front along the optical axis. What is the longitudinal magnification? **6 marks Assume that you can't use an approximation.**
d) If the boy sticks out his finger (2 cm long), use the approximation to calculate the length and orientation of the image. **3 marks**

3) Lens/ mirror problem: 5.66 **The ray is reversible. The spherical mirror has to create an image at the same position as its object**. **6 marks**

4) a) Two thin lenses: 5.38 **Do the calculation through the first lens and then the second lens. Describe position, orientation and real or virtual image. 10 marks including a description of the image.**

   b) What is the transverse magnification of the print? Use the product of magnifications through the two lenses. **4 marks**

   c) Repeat 5.38 using a thick lens calculation. Determine the focal length, the back focal length and the front focal length of the combination. Sketch the system. The diagram should show the cardinal points of the system and the focal lengths. **11 marks + diagram 10 marks**

   d) Use thick lens optics to calculate the image position. **5 marks**

5) Hecht 6.8 (spherical thick lens). Find the focal length first. Note the result from question 6.6 that the principal points of a sphere, acting as a thick lens, are both located at the centre of the sphere. **10 marks**

6) a) Hecht 6.10-locate the image by constructing to scale three rays through the system. Start by marking to scale the cardinal points. **8 marks**

b) Calculate f_i and the distance of the image from the second lens vertex. **4 marks**