Homework 2
Due in class on September 20, 2016

1. Perform the ray tracing, find whether the image is real/virtual, find the position and magnification of the image for the following 4 cases
   a. 
   \[ f = 5 \text{ cm}, v = 7 \text{ cm} \]
   \[ x = -7 \text{ cm} \]
   \[ \frac{1}{f} + \frac{1}{v} = \frac{1}{x} \]
   \[ \frac{1}{5} + \frac{1}{7} = \frac{1}{x} \]
   \[ x = -3.8 \text{ cm} \]

   Virtual object: \( f = 5 \text{ cm}, v = -3 \text{ cm} \) (hint: it may help to use the “previous” lens that created the object)

   b.
   \[ f = 5 \text{ cm}, v = 3 \text{ cm} \]
   \[ x = -3 \text{ cm} \]
   \[ \frac{1}{f} + \frac{1}{v} = \frac{1}{x} \]
   \[ \frac{1}{5} + \frac{1}{3} = \frac{1}{x} \]
   \[ x = -0.8 \text{ cm} \]

   c.
   \[ f = 3 \text{ cm}, v = 5 \text{ cm} \]
   \[ x = -5 \text{ cm} \]
   \[ \frac{1}{f} + \frac{1}{v} = \frac{1}{x} \]
   \[ \frac{1}{3} + \frac{1}{5} = \frac{1}{x} \]
   \[ x = -0.7 \text{ cm} \]

   Virtual object: \( f = 5 \text{ cm}, v = -3 \text{ cm} \) (hint: it may help to use the “previous” lens that created the object)

   d.

   \[ f = 3 \text{ cm}, v = 3 \text{ cm} \]
   \[ x = -3 \text{ cm} \]
   \[ \frac{1}{f} + \frac{1}{v} = \frac{1}{x} \]
   \[ \frac{1}{3} + \frac{1}{3} = \frac{1}{x} \]
   \[ x = -0.7 \text{ cm} \]

2. Problem 1.2-7 from the Book by Sibley
3. Problem 1.2-8
4. Problem 1.2-9
5. Problem 1.2-10
6. Find the principle planes of the boll lens in Problem 5 (both in air and water)
7. Problem 1.4-6
8. Problem 1.4-9
9. A person is watching the sky from the bottom of a pool. Which another person is looking from the outside into the pool. Which one experiences total internal reflection?