

# Assignment 2

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## Excercise 1 Fishtank VR, (6 Credits)

$$v_a = P_e + (P_3 - P_e) \cdot \lambda \quad (1)$$

$$v_b = P_e + (P_1 - P_e) \cdot \lambda \quad (2)$$

$$v_c = P_e + (P_2 - P_e) \cdot \lambda \quad (3)$$

$$\vec{v}_n = (P_2 - P_1) \times (P_3 - P_1) \quad (4)$$

$$z_0 = -\vec{v}_n \cdot v_a \quad (5)$$

### a) One eyed spectator

$$\vec{v}_r = \frac{P_2 - P_1}{|P_2 - P_1|} \quad \vec{v}_t = \frac{P_3 - P_1}{|P_3 - P_1|} \quad (6)$$

$$l' = -\vec{v}_r \cdot v_a \frac{n}{z_0} \quad l = \frac{n \cdot l'}{z_0} \quad (7)$$

$$r' = |P_2 - P_1| - l' \quad r = \frac{n \cdot r'}{z_0} \quad (8)$$

$$b' = -\vec{v}_t \cdot v_b \frac{n}{z_0} \quad b = \frac{n \cdot b'}{z_0} \quad (9)$$

$$t' = |P_3 - P_1| \quad t = \frac{n \cdot t'}{z_0} \quad (10)$$

$$(11)$$

### b) Left eye of a two eyed spectator

$$\alpha_h = \cos^{-1} \left( \frac{(P_1 - P_e) \cdot (P_2 - P_e)}{|P_1 - P_e| |P_2 - P_e|} \right) \quad (12)$$

$$\alpha_v = \cos^{-1} \left( \frac{(P_1 - P_e) \cdot (P_3 - P_e)}{|P_1 - P_e| |P_3 - P_e|} \right) \quad (13)$$

$$l_c = \tan\left(\frac{\alpha_h}{2}\right) \quad l_d = i_h \frac{z_0 - n}{z_0} \quad (14)$$

$$l' = l_c - i_h \frac{n}{z_0} \quad l = \frac{n \cdot l'}{z_0} \quad (15)$$

$$r' = |P_2 - P_1| - l' \quad r = \frac{n \cdot r'}{z_0} \quad (16)$$

$$b_c = \tan\left(\frac{\alpha_v}{2}\right) \quad b_d = i_v \frac{z_0 - n}{z_0} \quad (17)$$

$$b' = b_c - i_v \frac{n}{z_0} \quad b = \frac{n \cdot b'}{z_0} \quad (18)$$

$$t' = |P_3 - P_1| - b' \quad t = \frac{n \cdot t'}{z_0} \quad (19)$$

## Excercise 2 Practical horopter construction, (3 Credits)



(a) 20cm

(b) 50cm

(c) 100cm