Nom i cognoms: Francesca Mees Mlatiati

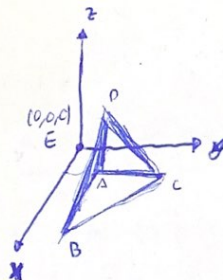*Assignatura:* Gràfics per Ordinador Avançats   *Grup:*   *Curs:*

Centre/Estudi:

Professor/a:

Data: 16/11/22

1. tetrahedra object
$$\begin{cases} A = (1,1,1) \\ B = (4,1,1) \\ C = (1,4,1) \\ D = (1,1,4) \end{cases}$$
camara → $E = (0,0,0)$

1) Launch ray from E towards point $P(2,2,1)$

direction reflected ray?

$$\boxed{r = 2(l \cdot n) n - l}$$ equation

$l = P - E = (2,2,1)$

$n = (P_B - P_A) \times (P_D - P_A) = \left[(4,1,1) - (1,1,1)\right] \times \left[(1,1,4) - (1,1,1)\right] = [3,0,0] \times [0,0,3]$

$$= \begin{vmatrix} i & j & k \\ 3 & 0 & 0 \\ 0 & 0 & 3 \end{vmatrix} = 0i + 0j + 0k - (0k + 0i + 9j) = -9j$$

$n = (0, 0, -9) = (0, 0, 1)$
    ↗ normalized

$r = 2 \cdot (\underbrace{[2,2,1] \cdot [0,0,1]}) \cdot (0,0,1) - l =$

$= 2 \cdot 1 \cdot (0,0,1) - (2,2,1) = (-2,-2,1)$

3) refraction, the angles with the normal correspond   snell law $r = \cos\alpha n + s$

$\dfrac{\sin\alpha}{\sin\beta} = \dfrac{n_t}{n_i} = \dfrac{1}{n_t}$ refracted ray $t = w_t$ $t = -\cos\beta n + s'$

$t \rightarrow$ unit vector $t = -\cos\beta n + \sin\beta \dfrac{s}{\|s\|}$ as $\|s\| = \sin\alpha$ $t = -\cos\beta n + n_t s$

$$\boxed{t = \left(\sqrt{1 - n_t^2 \sin^2\alpha} - n_t(l \cdot n)\right) n + n_t l}$$