#### Geometría Básica

Capítulo II: Axiomas para la Geometría Euclidiana Plana

Jackie Harjani y Belén López.

UNED, C.A. Las Palmas

Febrero 2011



#### Ejercicio 2.6.

Sea  $r \subset P$  una recta y  $A, B \in r$ ,  $A \neq B$ . Demostrar que para todo  $t \in \mathbb{R}$ , existe un punto  $P_t \in r$ , único, verificando:

$$d(P_t, A) = |t|$$
  
$$d(P_t, B) = |t - d(A, B)|$$

#### Ejercicio 2.6.

Sea  $r \subset P$  una recta y  $A, B \in r$ ,  $A \neq B$ . Demostrar que para todo  $t \in \mathbb{R}$ , existe un punto  $P_t \in r$ , único, verificando:

$$d(P_t, A) = |t|$$
  
$$d(P_t, B) = |t - d(A, B)|$$

#### Solución:

#### Capítulo II: Ejercicio 2.5

Existe  $\rho:r\longrightarrow\mathbb{R}$  cumpliendo el Axioma P3 y tal que:

$$i)$$
  $\rho(A) = 0$ 

$$ii)$$
  $\rho(B) = d(A, B)$ 



Si  $t \in \mathbb{R}$ 

$$\begin{aligned} &\text{Si } t \in \mathbb{R} \\ &\text{y} \\ &P_t = \rho^{-1}(t) \end{aligned}$$

$$\left. \begin{array}{l} \text{Si } t \in \mathbb{R} \\ \text{y} \\ P_t = \rho^{-1}(t) \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} \\ \end{array} \right.$$

$$\left. \begin{array}{l} \text{Si } t \in \mathbb{R} \\ \text{y} \\ P_t = \rho^{-1}(t) \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} d(P_t,A) = & |\rho(P_t) - \rho(A)| = |\rho(\rho^{-1}(t)) - 0| = |t| \\ \end{array} \right.$$

$$\left. \begin{array}{l} \text{Si } t \in \mathbb{R} \\ \text{y} \\ P_t = \rho^{-1}(t) \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} d(P_t,A) = & |\rho(P_t) - \rho(A)| = |\rho(\rho^{-1}(t)) - 0| = |t| \\ d(P_t,B) = & |\rho(P_t) - \rho(B)| = |t - d(A,B)| \end{array} \right.$$

$$\left. \begin{array}{l} \operatorname{Si}\,t \in \mathbb{R} \\ \operatorname{y} \\ P_t = \rho^{-1}(t) \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} d(P_t,A) = & |\rho(P_t) - \rho(A)| = |\rho(\rho^{-1}(t)) - 0| = |t| \\ d(P_t,B) = & |\rho(P_t) - \rho(B)| = |t - d(A,B)| \end{array} \right.$$

#### Unicidad de $P_t$

$$\left. \begin{array}{l} \text{Si } t \in \mathbb{R} \\ \text{y} \\ P_t = \rho^{-1}(t) \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} d(P_t,A) = & |\rho(P_t) - \rho(A)| = |\rho(\rho^{-1}(t)) - 0| = |t| \\ d(P_t,B) = & |\rho(P_t) - \rho(B)| = |t - d(A,B)| \end{array} \right.$$

#### Unicidad de $P_t$

$$d(P', A) = |t|$$
  
 
$$d(P', B) = |t - d(A, B)|$$



$$\left. \begin{array}{l} \text{Si } t \in \mathbb{R} \\ \text{y} \\ P_t = \rho^{-1}(t) \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} d(P_t,A) = & |\rho(P_t) - \rho(A)| = |\rho(\rho^{-1}(t)) - 0| = |t| \\ d(P_t,B) = & |\rho(P_t) - \rho(B)| = |t - d(A,B)| \end{array} \right.$$

#### Unicidad de $P_t$

$$\begin{array}{ll} d(P',A) = & |t| \\ d(P',B) = & |t-d(A,B)| \end{array} \right\} \stackrel{\rho \text{ isom.}}{\Rightarrow} \ \left\{ \end{array}$$



$$\left. \begin{array}{l} \text{Si } t \in \mathbb{R} \\ \text{y} \\ P_t = \rho^{-1}(t) \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} d(P_t,A) = & |\rho(P_t) - \rho(A)| = |\rho(\rho^{-1}(t)) - 0| = |t| \\ d(P_t,B) = & |\rho(P_t) - \rho(B)| = |t - d(A,B)| \end{array} \right.$$

#### Unicidad de $P_t$

$$\begin{array}{ll} d(P',A) = & |t| \\ d(P',B) = & |t-d(A,B)| \end{array} \right\} \stackrel{\rho \text{ isom.}}{\Rightarrow} \left\{ \begin{array}{l} |\rho(P')| = |t| \end{array} \right.$$



$$\left. \begin{array}{l} \operatorname{Si} \ t \in \mathbb{R} \\ \operatorname{y} \\ P_t = \rho^{-1}(t) \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} d(P_t,A) = & |\rho(P_t) - \rho(A)| = |\rho(\rho^{-1}(t)) - 0| = |t| \\ d(P_t,B) = & |\rho(P_t) - \rho(B)| = |t - d(A,B)| \end{array} \right.$$

#### Unicidad de $P_t$

$$\begin{array}{ll} d(P',A) = & |t| \\ d(P',B) = & |t-d(A,B)| \end{array} \right\} \ \stackrel{\rho \text{ isom.}}{\Rightarrow} \ \left\{ \begin{array}{ll} |\rho(P')| = |t| \\ |\rho(P') - d(A,B)| = |t-d(A,B)| \end{array} \right.$$

$$\left. \begin{array}{l} \text{Si } t \in \mathbb{R} \\ \text{y} \\ P_t = \rho^{-1}(t) \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} d(P_t,A) = & |\rho(P_t) - \rho(A)| = |\rho(\rho^{-1}(t)) - 0| = |t| \\ d(P_t,B) = & |\rho(P_t) - \rho(B)| = |t - d(A,B)| \end{array} \right.$$

#### Unicidad de $P_t$

Sea  $P' \in r$  tal que:

$$\begin{array}{ll} d(P',A) = & |t| \\ d(P',B) = & |t-d(A,B)| \end{array} \right\} \ \stackrel{\rho \text{ isom.}}{\Rightarrow} \ \left\{ \begin{array}{ll} |\rho(P')| = |t| \\ |\rho(P') - d(A,B)| = |t-d(A,B)| \end{array} \right.$$

Única solución del sistema  $\rho(P')=t$ 



$$\left. \begin{array}{l} \text{Si } t \in \mathbb{R} \\ \text{y} \\ P_t = \rho^{-1}(t) \end{array} \right\} \Rightarrow \left\{ \begin{array}{ll} d(P_t,A) = & |\rho(P_t) - \rho(A)| = |\rho(\rho^{-1}(t)) - 0| = |t| \\ d(P_t,B) = & |\rho(P_t) - \rho(B)| = |t - d(A,B)| \end{array} \right.$$

#### Unicidad de $P_t$

Sea  $P' \in r$  tal que:

$$\begin{array}{ll} d(P',A) = & |t| \\ d(P',B) = & |t-d(A,B)| \end{array} \right\} \stackrel{\rho \text{ isom.}}{\Rightarrow} \left\{ \begin{array}{ll} |\rho(P')| = |t| \\ |\rho(P') - d(A,B)| = |t-d(A,B)| \end{array} \right.$$

Única solución del sistema  $\rho(P')=t$   $\stackrel{
ho}{\Rightarrow}$   $P'=P_t.$ 

