

$$\det(A, B, C) = \begin{vmatrix} x_0 & x_1 & x_2 \\ y_0 & y_1 & y_2 \end{vmatrix}$$

> 0

= 0

< 0

A, B, C: counterclockwise

co-linear

A, B, C: clockwise

C is on the left side of \overrightarrow{AB} C is on the right side of \overrightarrow{AB}

A, B, C: a left turn

A, B, C: a right turn

 $\theta_B < \theta_C$ (A is the original) $\theta_B = \theta_C$ $\theta_B > \theta_C$ Problem 1. Find the point with the smallest θ : $O(n)$ timeProblem 2. Sort the points according to θ : $O(n \lg n)$ time

Find the minimum

```

min = A[1]
for i = 2 to n do
  if  $A[i] < \min$  then min = A[i]

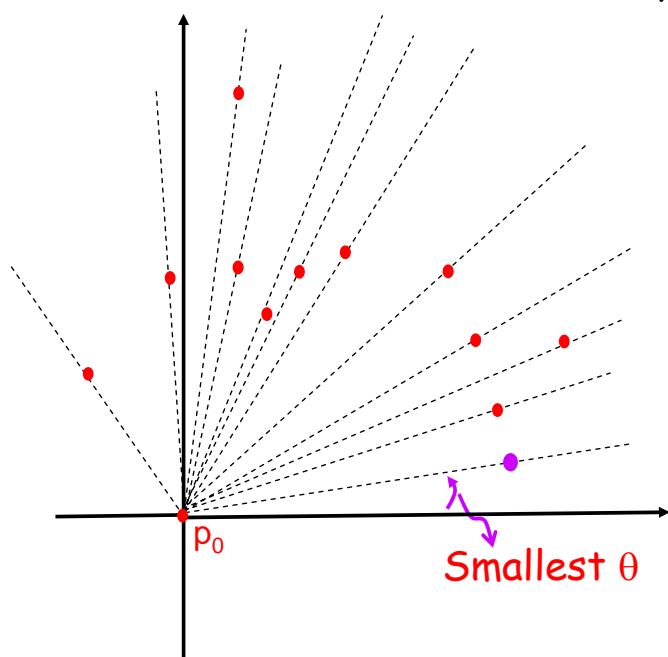
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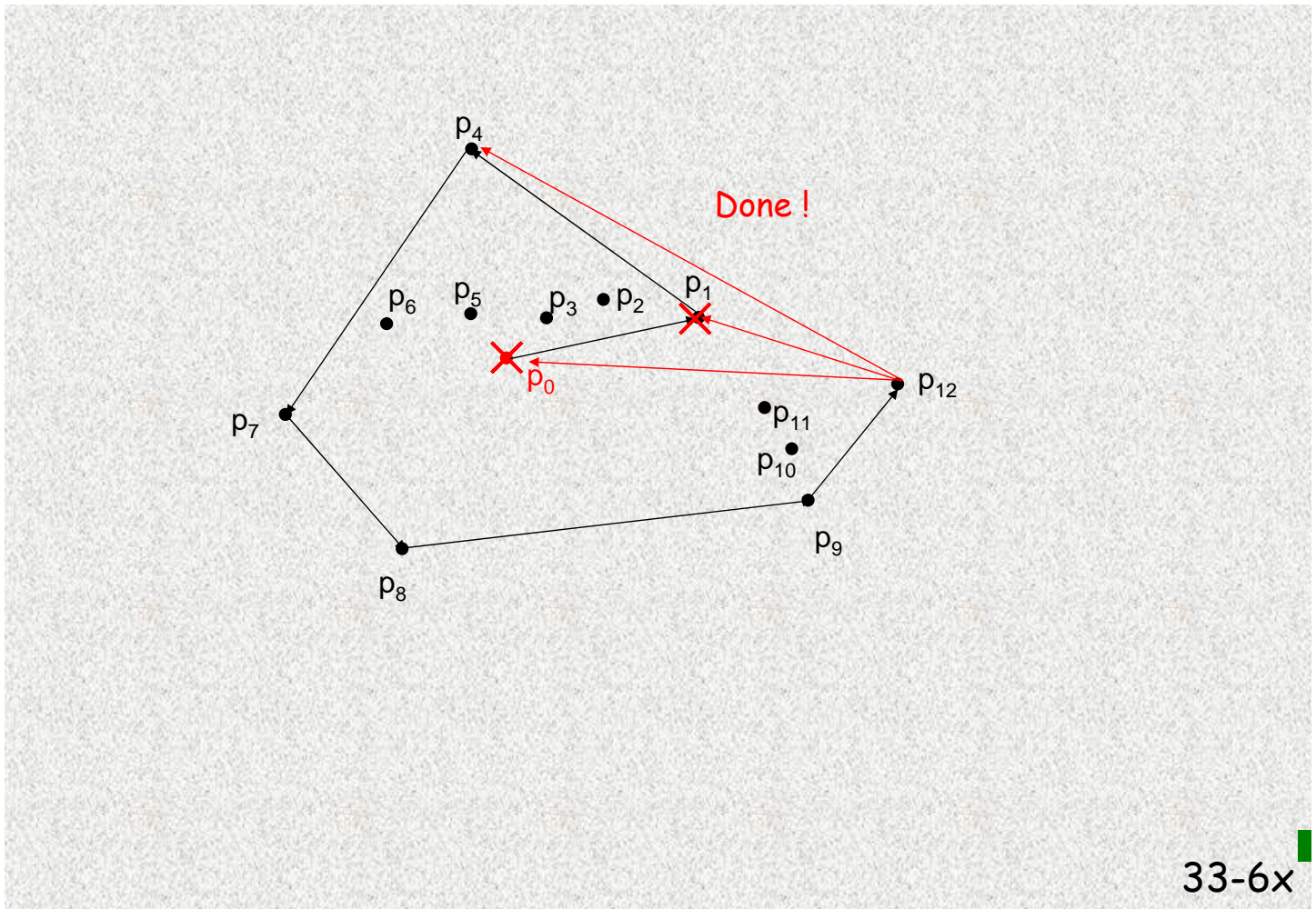
Find the point with the smallest θ
function compare(p_0, a, b):
$$\begin{cases} 0: \theta_a \leq \theta_b \\ 1: \theta_a > \theta_b \end{cases}$$

```

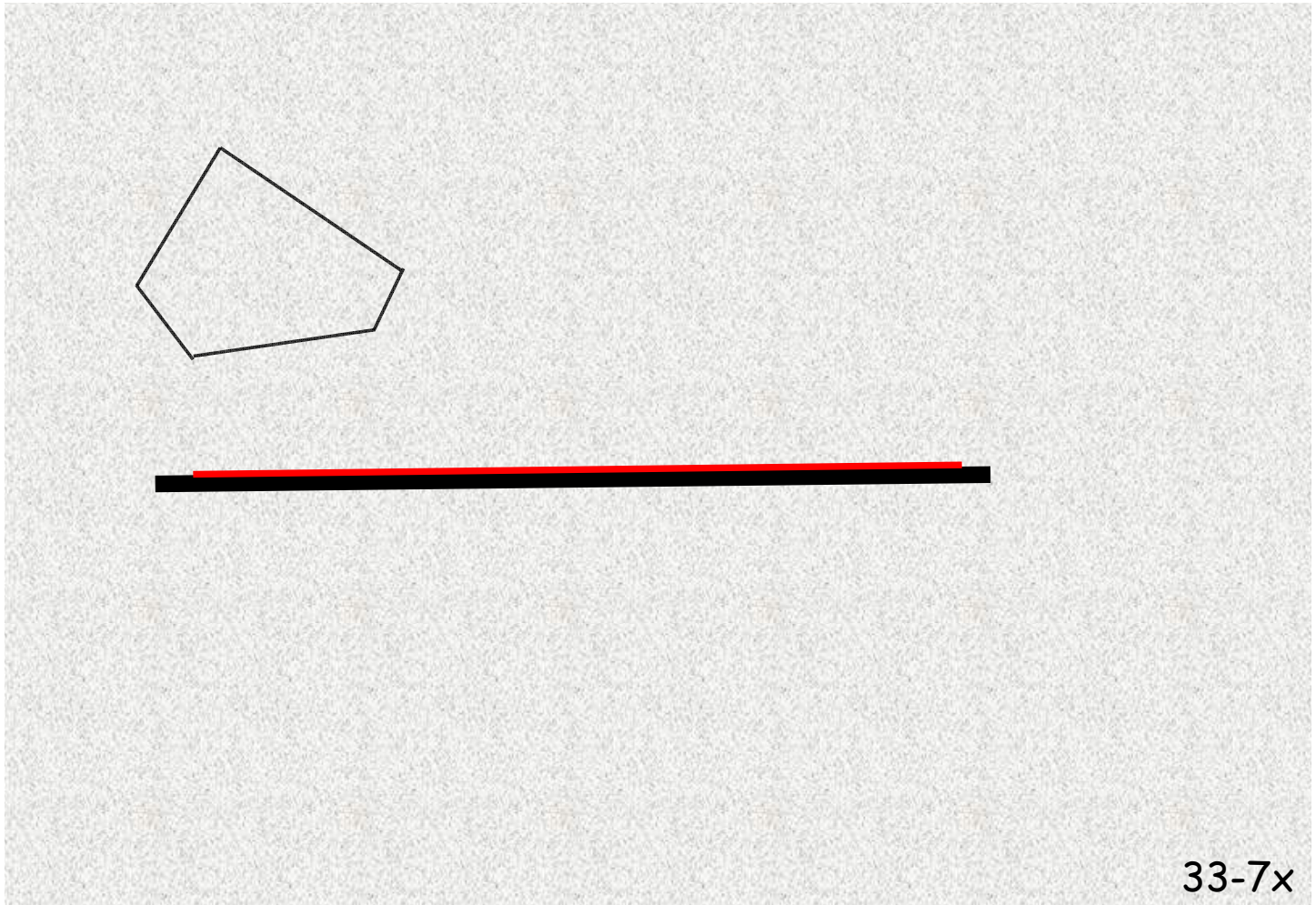
min = p_1
for i = 2 to n do
  if compare( $p_0, \min, p_i$ ) then min = p_i

```





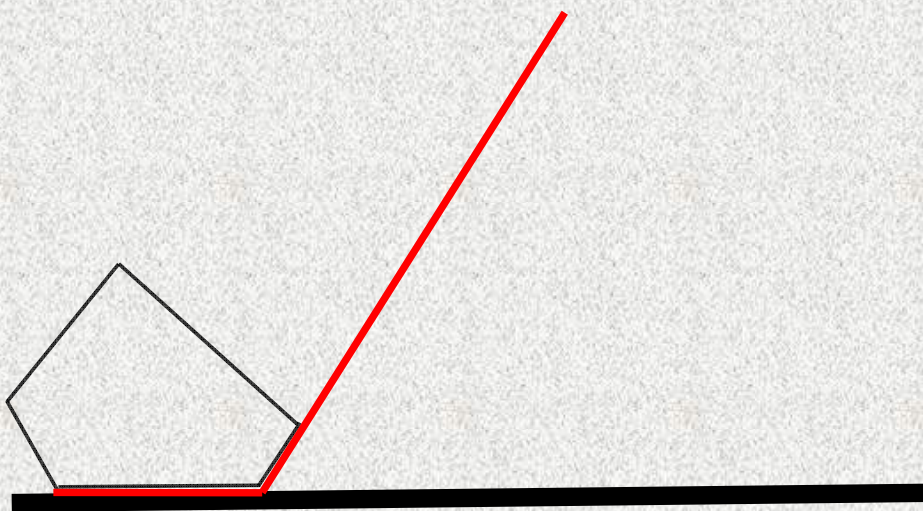
33-6x



33-7x



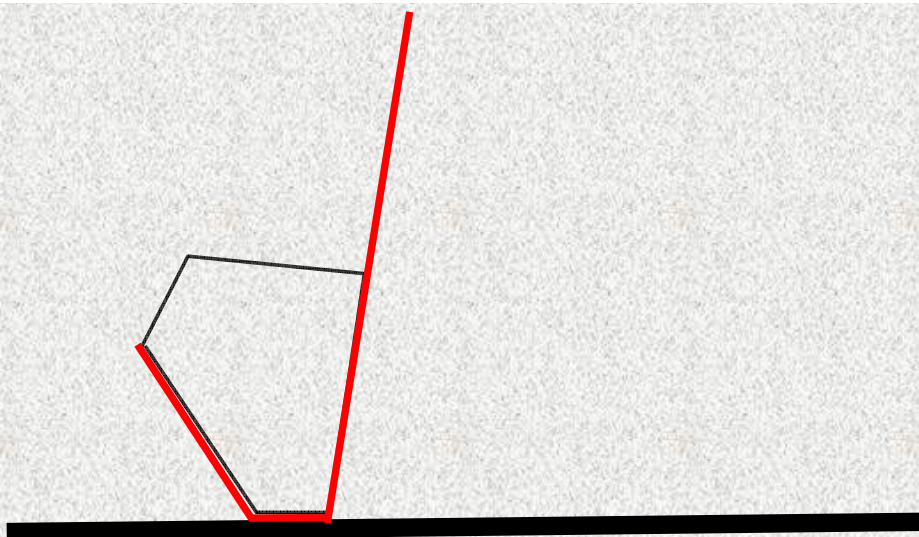
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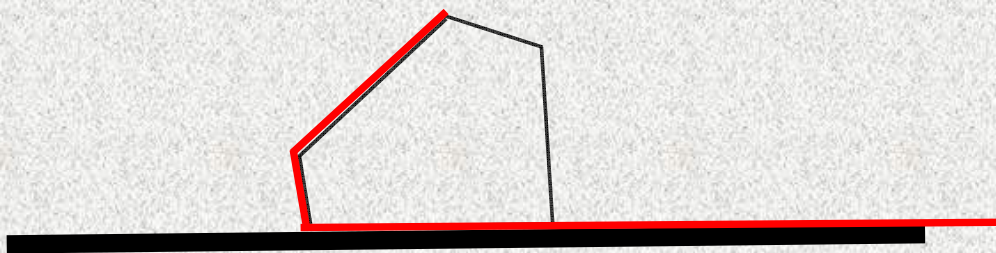
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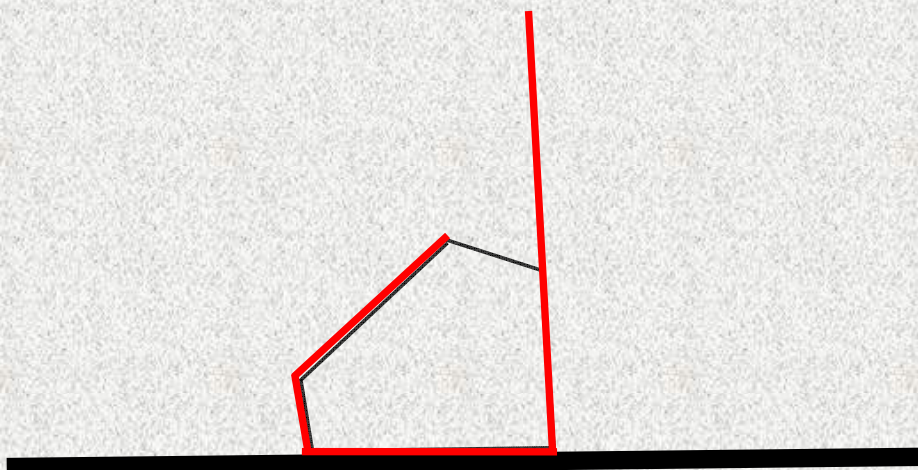
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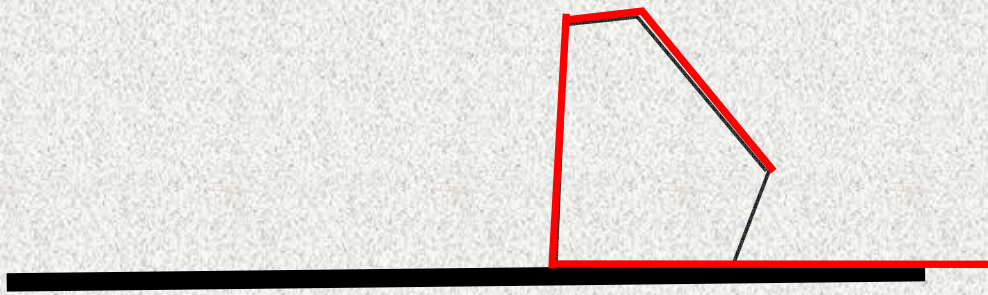
33-7x



33-7x

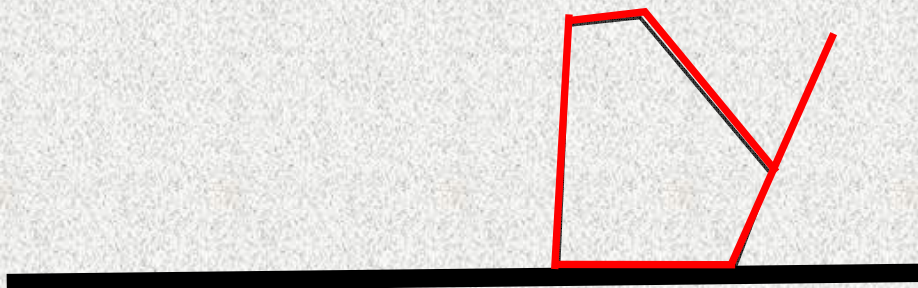


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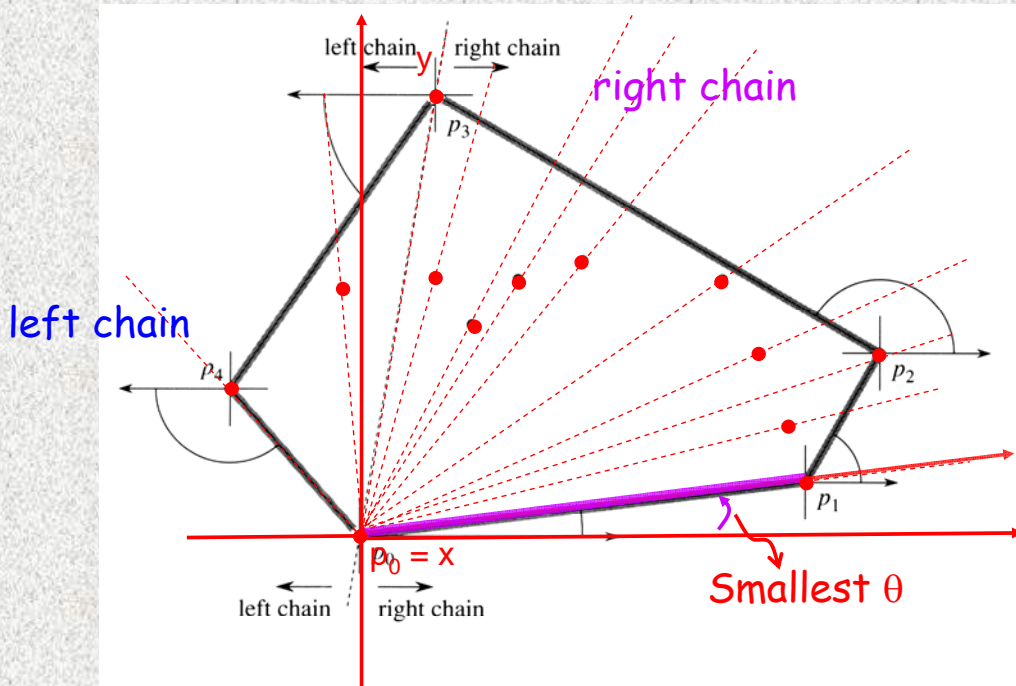


33-7x

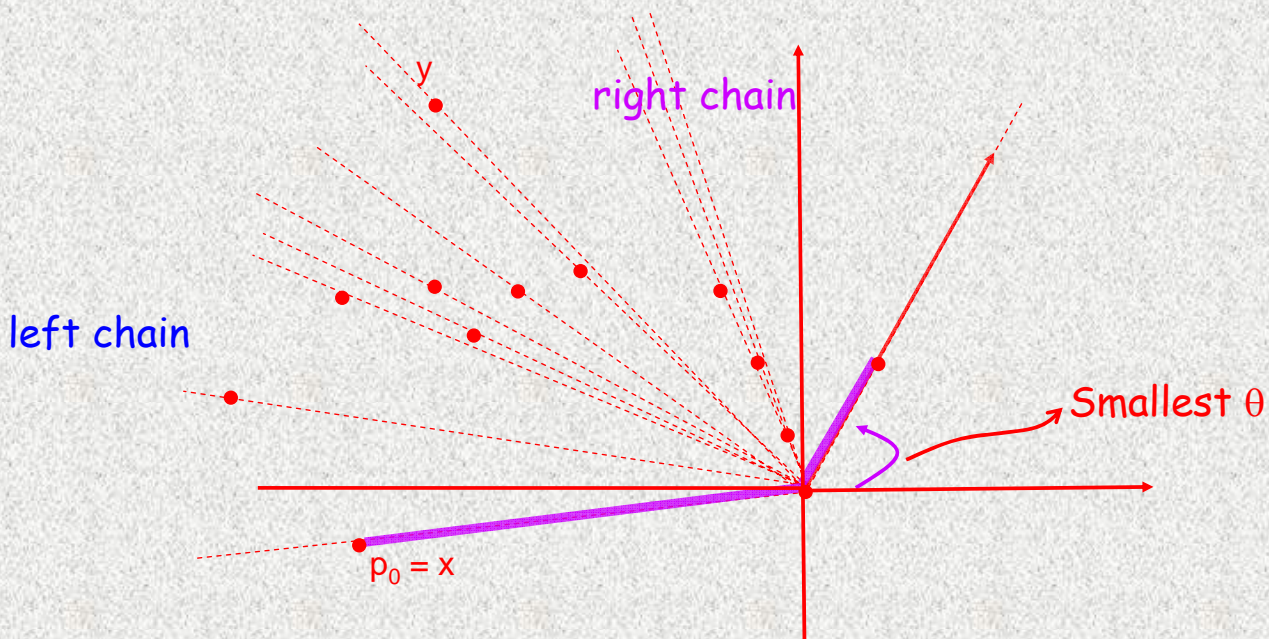
package wrapping or gift wrapping



33-7x



33-8x



33-8x

