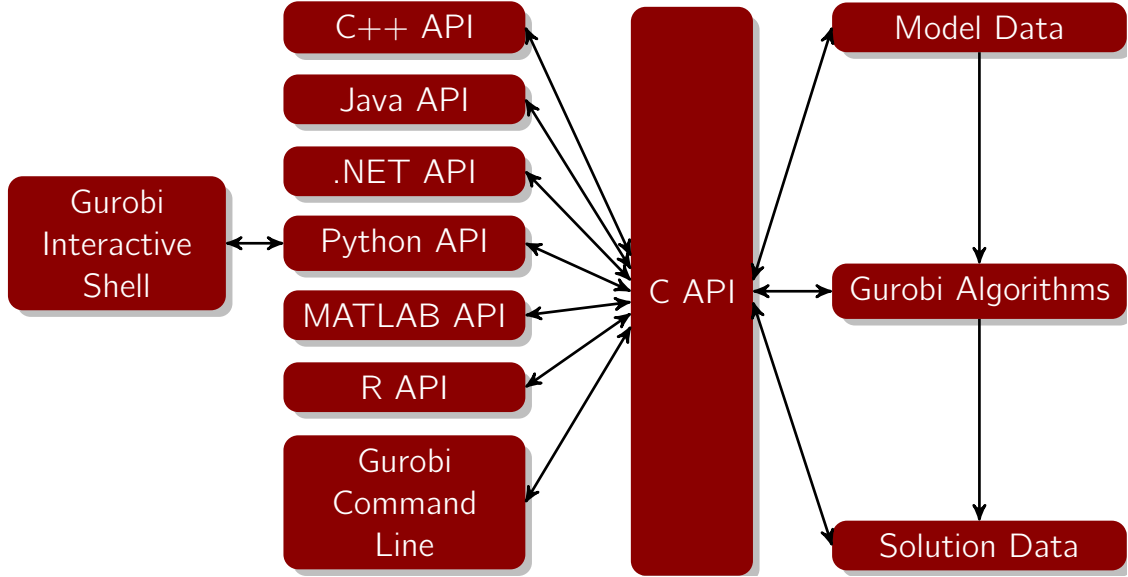




GUROBI

OPTIMIZATION



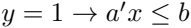
www.xixixi.com

www.vivian.com

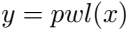


1992-1993

1992-93



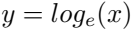


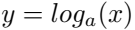


$$v = p_0 x^2 + p_1 x - 1 + \dots + p_n x$$

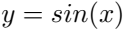




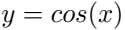


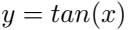
















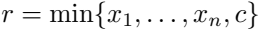


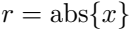












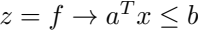


1991-1992















1011











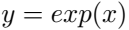




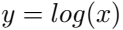






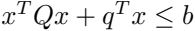












2020 + 2021 = 4041





























QWERTY





`model.addConstr(expr1 <= expr2)`

`model.addConstr(expr1 == 1)`

`model.addConstr(2 * x + 3 * y <= 4)`





```
model.addQConstr(qexpr1 <= qexpr2)
```

```
model.addQConstr(qexpr1 == 1)
```

```
model.addQConstr(2 * x * x + 3 * y * y <= 4)
```

```
model.addConstr(expr1, GRB.LESS_EQUAL, expr2)
```

```
model.addConstr(expr1, GRB.EQUAL, 1)
```

```
model.addQConstr(qexpr1, GRB.LESS_EQUAL, qexpr2)
```

```
model.addQConstr(qexpr1, GRB.EQUAL, 1)
```

`model.AddConstr(expr1 <= expr2)`

`model.AddConstr(expr1 == 1)`

`model.AddConstr(2 * x + 3 * y <= 4)`



model.AddQConstr( $qexpr1 \leq qexpr2$ )

model.AddQConstr( $qexpr1 == 1$ )

model.AddQConstr( $2 * x * x + 3 * y * y \leq 4$ )









$\sin(x) + \cos(x) = \sqrt{2}$

```
model.addConstr(qexpr1 <= qexpr2)
```

```
model.addConstr(qexpr1 == 1)
```

```
model.addConstr(2 * x * x + 3 * y * y <= 4)
```

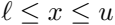








$x^2 + x + 1$







1999

$x \left[ \frac{1}{2} \right] = \frac{1}{2} x \left[ \frac{1}{2} \right]$





$x_{\text{rev}} = x_{\text{cor}, x_{\text{rev}}}$

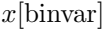


2023-2024

$x_{\text{inv}} = x_{\text{inv}} \cdot x_{\text{inv}}$

$x_{\text{var}} = \text{ord}(\text{var})$

$$x[bivar] = bivar(x(v)) \text{ set the}$$





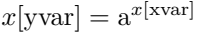




www.wwi.org

$$x[\text{var}] = p_0 x[\text{var}]^d + p_1 x[\text{var}]^{d-1} + \dots + p_{d-1} x[\text{var}] + p_d$$

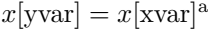
www.arp.org



2023-10-27

$$x \log(x) = \log(x)$$





www.birds.org.uk

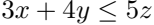
2023-2024

*var[1] = val[1]*

*odjB odjV odj*



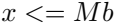






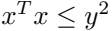


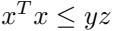






32 + 52 = 10













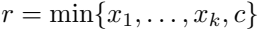
2021-2022-2023

www.xbox.com

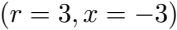


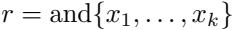


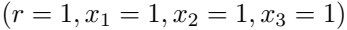












Handwritten text: "The end of the world is near"













2012. 2. 2. 2012. 2. 2.

$$r = x_j + s_j \quad \text{for all } j = 1, \dots, k$$

$$r = c + s_{k+1}$$

$$z_1 + \dots + z_{k+1} = 1$$

$$SOS1(s_j, z_j) \quad \text{for all } j = 1, \dots, k + 1$$

$$s_j \geq 0 \quad \text{for all } j = 1, \dots, k + 1$$

$$z_j \in \{0, 1\} \quad \text{for all } j = 1, \dots, k + 1$$

2022-2023



www.xixi.com

2013









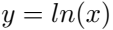




$r \geq x_j$  for all  $j = 1, \dots, k$

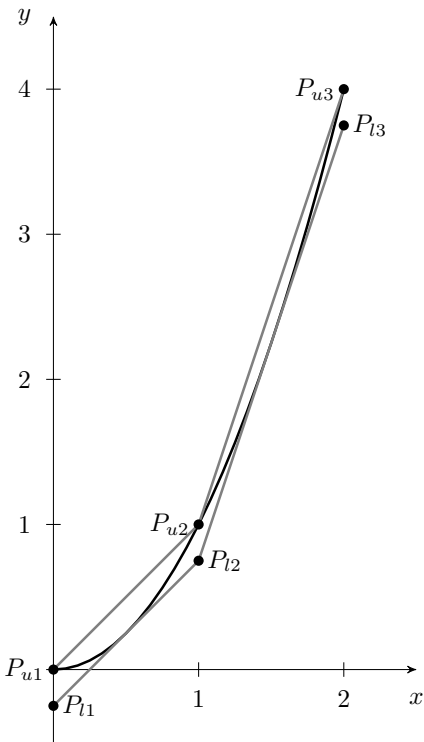
$r \geq c$

$$p_0 x^2 + p_1 x - 1 + p_2 x^2 + p_3 x^2 + p_4 x^2 + 1$$















Pravda, pravda, pravda,

Pr1025, Pr1075, Pr1237





















100% 100%

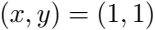


2020













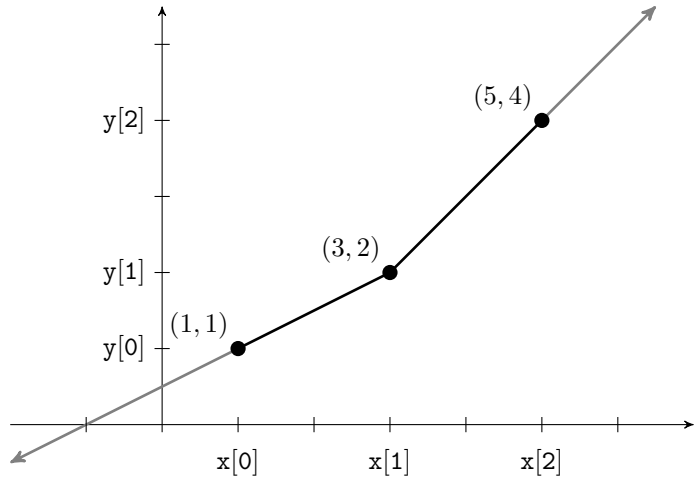












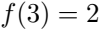












150 = 4

101010

100005

$$\begin{aligned}
 & \left[ \begin{array}{c} \mathbf{X} \\ \mathbf{Y} \end{array} \right] = \left[ \begin{array}{c} \mathbf{X} \\ \mathbf{Y} \end{array} \right] \\
 & \left[ \begin{array}{c} \mathbf{X} \\ \mathbf{Y} \end{array} \right] = \left[ \begin{array}{c} \mathbf{X} \\ \mathbf{Y} \end{array} \right] \\
 & \left[ \begin{array}{c} \mathbf{X} \\ \mathbf{Y} \end{array} \right] = \left[ \begin{array}{c} \mathbf{X} \\ \mathbf{Y} \end{array} \right]
 \end{aligned}$$

$$f(v) = \begin{cases} y_1 + \frac{y_2 - y_1}{x_2 - x_1} (v - x_1), & \text{if } v \leq x_1, \\ y_i + \frac{y_{i+1} - y_i}{x_{i+1} - x_i} (v - x_i), & \text{if } v \geq x_i \text{ and } v \leq x_{i+1}, \\ y_n + \frac{y_n - y_{n-1}}{x_n - x_{n-1}} (v - x_n), & \text{if } v \geq x_n. \end{cases}$$

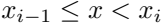


$$(x-1, y-1), (x+1, y+1), (x-1, y+1), (x+1, y-1)$$



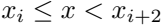


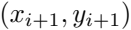


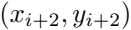


1991-1992







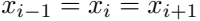


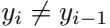




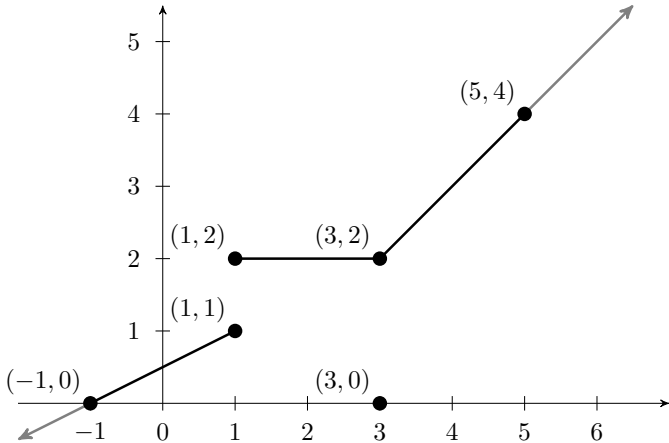


$$(x_2, x_2), (x_1, x_1), (x_2, x_1), (x_1, x_2), (x_1, x_2), (x_2, x_2)$$







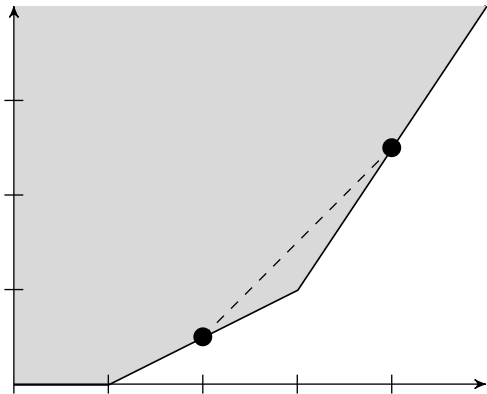


(-1, 0, 1, 2, 3, 0, 1, 2, 3, 0, 1, 2)

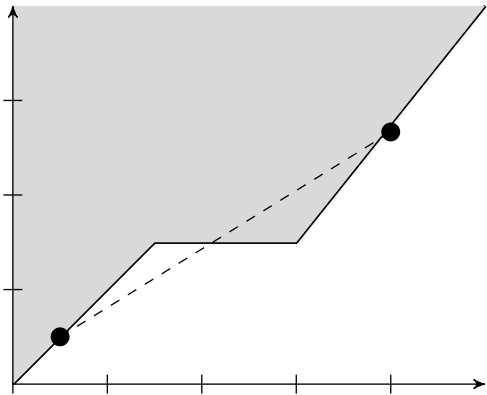




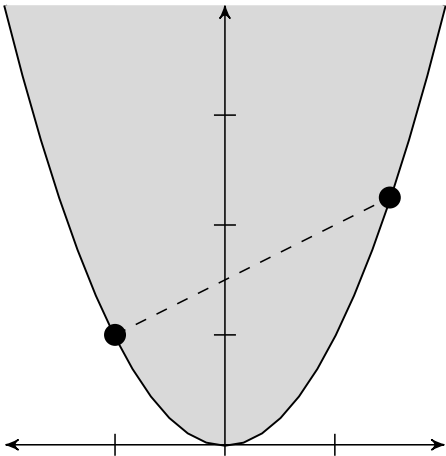








$$3x^2 + 4x^2 + 2x^2 + 2x^2 + 2x^2$$









$$\bar{a}x = \lambda^t Ax \leq \lambda^t b = -\beta + \sum_{j: \bar{a}_j < 0} \bar{a}_j U_j + \sum_{j: \bar{a}_j > 0} \bar{a}_j L_j,$$

























minimize  $c'x$

subject to  $Ax \geq b$

$x \geq 0$

$$\begin{array}{ll}
 \text{maximize} & b'y \\
 \text{subject to} & A'y \leq c \\
 & y \geq 0
 \end{array}$$























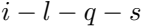








































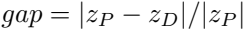






















$$(10x01^2+2x01x02+2x02x01+2x02^2)/2$$









$$\begin{array}{ll}
\text{minimize} & y - 1.3x(1 - z) + (1 - z) \\
\text{subject to} & 2y - 3x + 1.7w = 1.7 \\
& -y + x + xz(1 - v) \geq 0 \\
& -y \leq 0, \\
& v, w, x, y, z \in \{0, 1\}.
\end{array}$$







$$1 - (1 + x + x^2)(x + x^2) = 1 - x + x^2$$

100



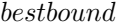






$$\text{base\_value} = \max\{\text{bestsol}, \text{bestbd} + \text{gap}, \text{bestbd} + \text{agap}\}$$















12345

100100050001

0123



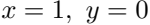
$$x - 6y = 1$$

$$0.333x - 2y = .333$$

0501050105

$$x - 6 \cdot (0.1665x - 0.1665) = 1$$

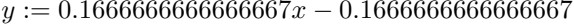
$$\Leftrightarrow 0.001x = 0.001$$



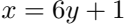


$$x - 6y = 1$$

$$0.3333333333333333x - 2y = 0.3333333333333333$$



$$\begin{aligned}
 x - 6 \cdot (0.16666666666666667x - 0.16666666666666667) &= 1 \\
 \Leftrightarrow 2 \cdot 10^{-16}x + 1 + 2 \cdot 10^{-16} &\approx 1
 \end{aligned}$$



1

2

1

+

2

.

1

0

-

10









$$\min \quad 0$$

$$s.t. \quad x \leq 0$$

$$x \geq 10^{-10}$$









we are 100% 100%







$\left( \frac{1}{2} \ln \frac{1+x}{1-x} \right) = \frac{1}{2} \ln \frac{1+x}{1-x}$









Handwritten text: *Handwritten text: 10/10/10*









1000



$\frac{d}{dx} \left( x^2 + 1 \right) = 2x$



$$\begin{array}{rcl}
10^{-7}x + 10y & \leq & 10 \\
x + 10^4z & \leq & 10^3 \\
x, y, z & \geq & 0,
\end{array}$$

100-7 100-1

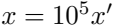
105



$$10^{-2}x' + 10y \leq 10$$

$$10^2x' + 10z \leq 1$$

$$x', y, z \geq 0,$$



10-2010-2

100-3 1001

$$\begin{aligned}
 x - 10^6 y &\geq 0 \\
 y &\in [0, 10]
 \end{aligned}$$

$$x - 10y_1 \geq 0$$

$$y_1 - 10y_2 = 0$$

$$y_2 - 10y_3 = 0$$

$$y_3 - 10y_4 = 0$$

$$y_4 - 10y_5 = 0$$

$$y_5 - 10y = 0$$

$$y \in [0, 10]$$



$$\begin{aligned}
 x - 10^3 y' &\geq 0 \\
 y' &\in [0, 10^4]
 \end{aligned}$$



10-23-2020





$$x \leq 10^6 y$$

$$x \geq 0$$

$$y \in \{0, 1\},$$

WELCOME TO THE



$$x \leq 10^3 y$$

$$x \geq 0$$

$$y \in \{0, 1\}$$

QWERTY





100

$$6 \cdot 10^6 / 0.00099 = 6.0606 \cdot 10^9$$





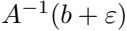












$$\|b, e\| = \frac{\|A^{-1}b\|}{\|A^{-1}(b+e)\|} \leq \frac{\|b\|}{\|b+e\|}.$$

W.A. = Waxweasel

$\pi(A)$

$=$

$\lambda_1 \lambda_2 \lambda_3$









100%



max

$cx$

s.t.

$Ax \leq b.$

$$\begin{array}{llll}
 \max & x + y & \vec{c} = & (1, 1) \\
 s.t. & -x \leq 0 & A_1 = & (-1, 0) \\
 & x \leq 1 & A_2 = & (1, 0) \\
 & -y \leq 0 & A_3 = & (0, -1) \\
 & y \leq 1 & A_4 = & (0, 1).
 \end{array}$$

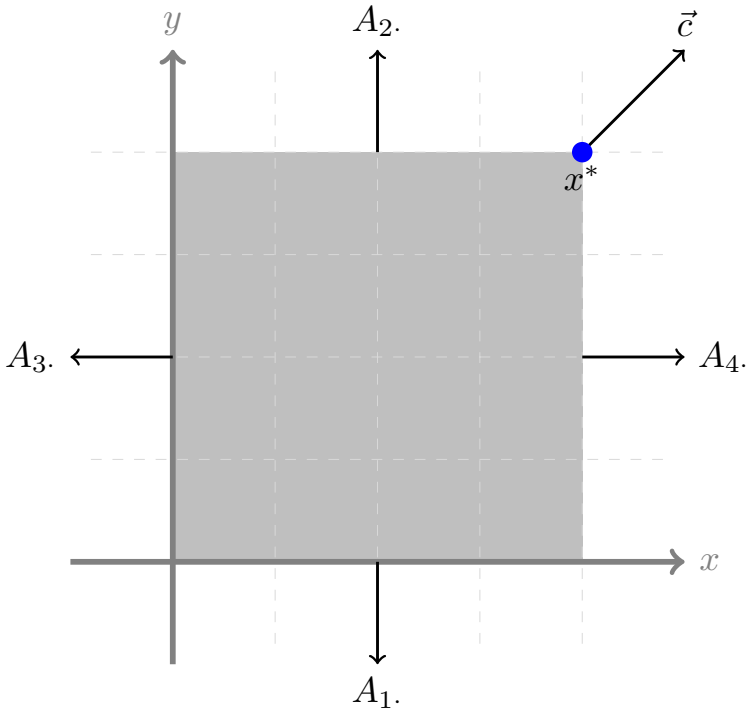


Waxen waxen  
waxen waxen  
waxen waxen











for 10,000

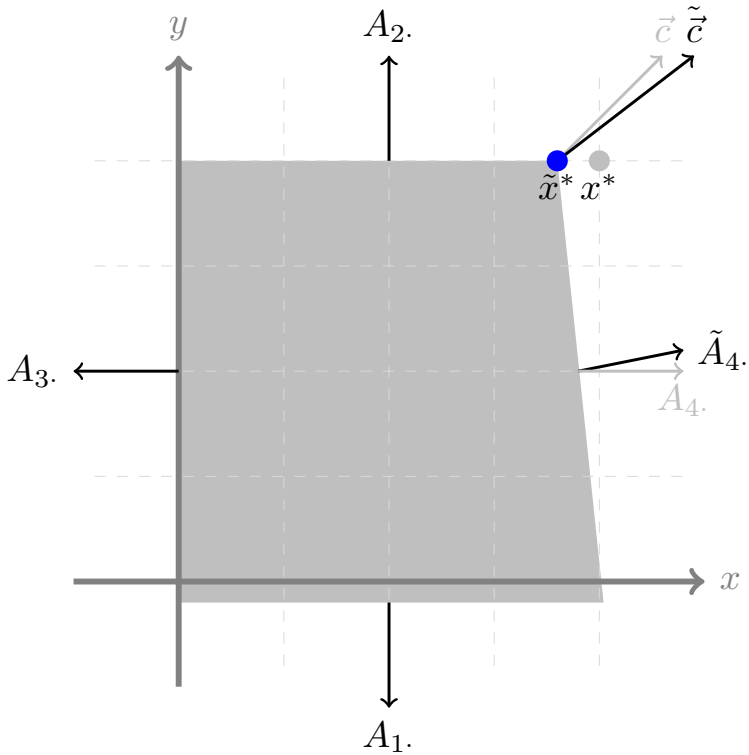


100

100

100

100





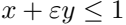




100%

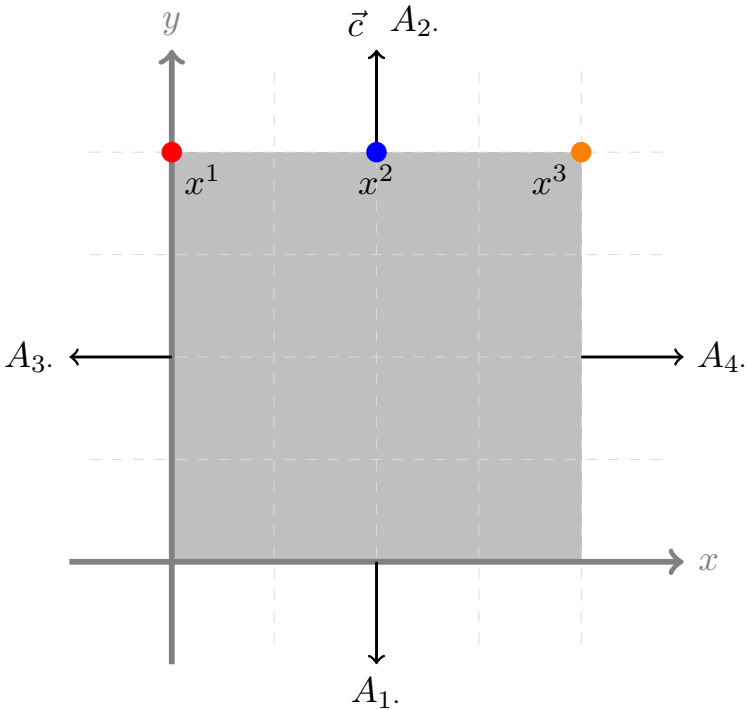


100%



A pixelated, black and white graphic of the text "100% + 50% 100%". The text is rendered in a bold, blocky font with a dithered or pixelated appearance. The characters are composed of various shades of gray and black pixels. The plus sign is a simple cross shape. The overall style is reminiscent of early digital art or low-resolution computer graphics.

$$\begin{array}{llll}
\max & & y & \vec{c} = (0, 1) \\
s.t. & -x \leq 0 & A_1. = & (-1, 0) \\
& x \leq 1 & A_2. = & (1, 0) \\
& -y \leq 0 & A_3. = & (0, -1) \\
& y \leq 1 & A_4. = & (0, 1).
\end{array}$$



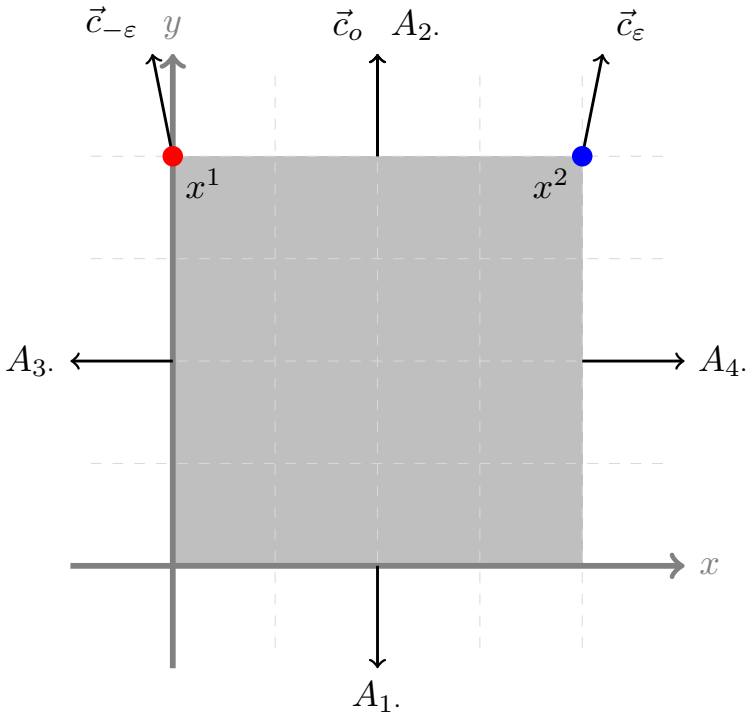








$$\begin{array}{llll}
\max & \varepsilon x + y & \vec{c} = & (\varepsilon, 1) \\
s.t. & -x \leq 0 & A_1. = & (-1, 0) \\
& x \leq 1 & A_2. = & (1, 0) \\
& -y \leq 0 & A_3. = & (0, -1) \\
& y \leq 1 & A_4. = & (0, 1).
\end{array}$$







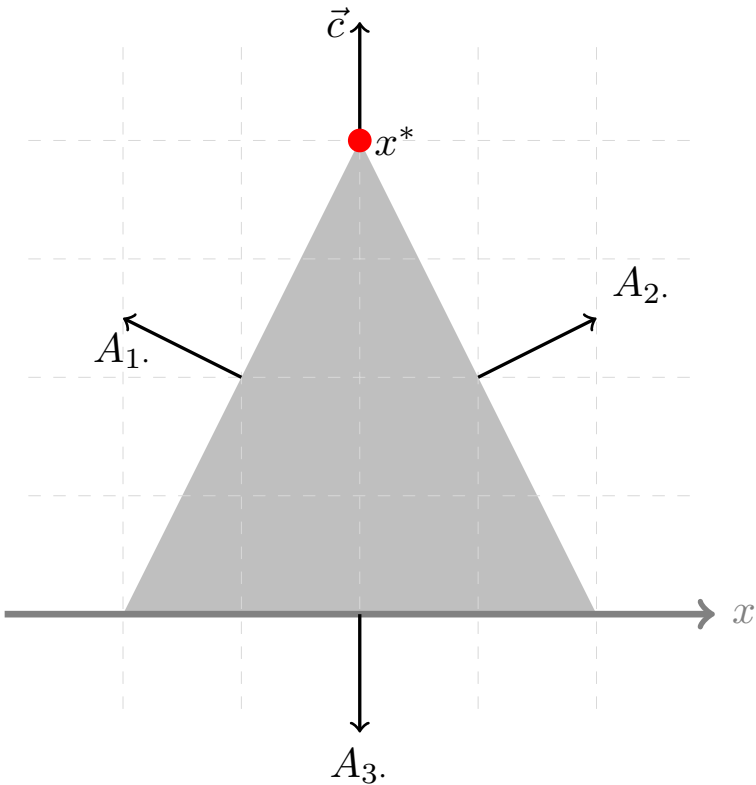
100% 1

100%



$$\begin{array}{llll}
\max & & y & \vec{c} = (0, 1) \\
s.t. & -x + \varepsilon y \leq 1 & A_1. = & (-1, \varepsilon) \\
& x + \varepsilon y \leq 1 & A_2. = & (1, \varepsilon) \\
& -y \leq 0 & A_3. = & (0, -1)
\end{array}$$



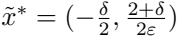






1001







||x\*

—

x\*

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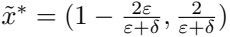
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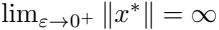


















$$\sin(2\pi \frac{i}{10^6})x + \cos(2\pi \frac{i}{10^6})v \leq 1, \forall i \in \{1, \dots, 10^6\},$$



