Entraînement - Training

INSTRUCTION : *English version below*
*En haut de chaque page se trouvent 3 nombres, par exemple +1/3/58+. Vous **devez** vérifier que, sur chacune des pages de votre sujet, le **premier** de ces 3 nombres est le même (dans cet exemple, il s'agit donc du 1). Ce nombre identifie votre copie. Les deux autres nombres ne sont pas importants.*
*Détacher la dernière feuille et répondre dessus. Ne pas rendre les pages contenant les questions, vous ne devez rendre **que la dernière feuille**. Chaque question est sur 1 point, aucun point ne sera attribué aux questions contenant une mauvaise réponse.*
Les questions faisant apparaître le symbole ♣ peuvent présenter une ou plusieurs bonnes réponses qui doivent toutes être cochées. Les autres ont une unique bonne réponse.

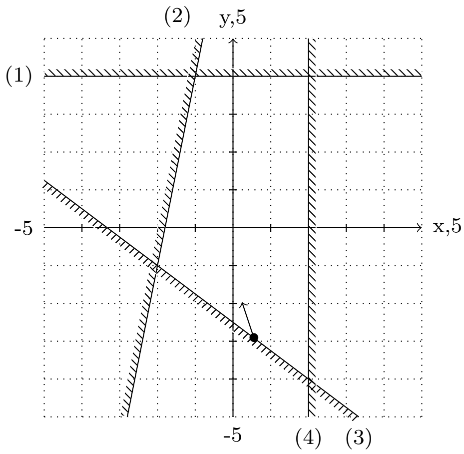
*At the top of each page are written 3 numbers, +1/3/58+. You **must** check that, on each page you have, the **first** number is the same (in this case, it would be the number 1). This number is the id of your subject. The two other numbers are not important.*
*Answer only on the last page. Keep the other pages containing the questions, you just have to return **the last page**. Each right answer gives you 1 point. For any wrong answer, the mark of the question is 0.*
If there is a question with a symbol ♣, there may be one or more right answer. All of them must be checked. Any other question has only one right answer.

Question 1 ♣

By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.

There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).

The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

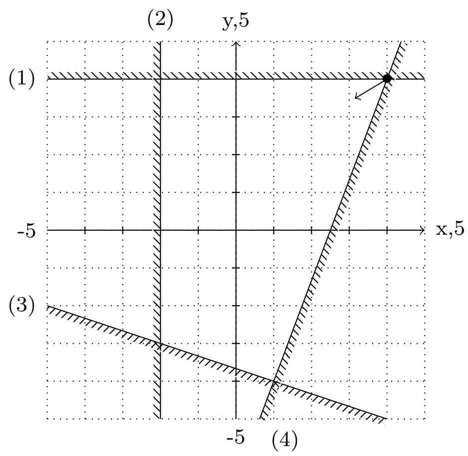
- [ ] 1 $I(x) = [1, 3]$
- [ ] 2 $I(x) = [2]$
- [x] $I(x) = [3]$
- [ ] 4 $d = \vec{0}$
- [ ] 5 $d = (-0.66; 0.49)$
- [x] $d = (0.66; -0.49)$
- [ ] 7 $\lambda_3 = -0.02$
- [ ] 8 $\lambda_3 = 0.02$
- [x] Pas de calcul de λ_3

Question 2 ♣

By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.

There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).

The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. We computed $I(x) = [1,4]$ et $d = \vec{0}$. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

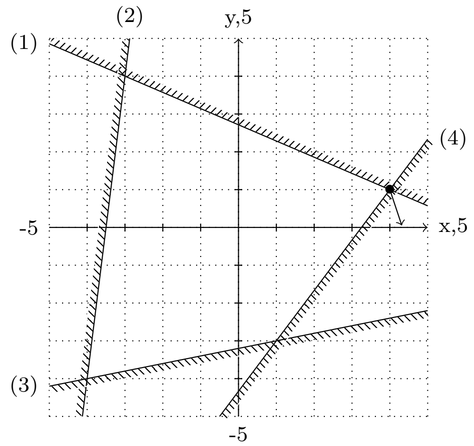
- $\boxed{1}$ $\lambda_1 = -0.84; \lambda_4 = -0.11$
- $\boxed{2}$ $\lambda_1 = 0.84; \lambda_4 = -0.11$
- $\boxed{3}$ Pas de calcul de λ_1, λ_4
- $\boxed{4}$ $\lambda_1 = -0.84; \lambda_4 = 0.11$
- ■ $\lambda_1 = 0.84; \lambda_4 = 0.11$
- ■ Pas de calcul de $I(x)'$
- $\boxed{7}$ $I(x)' = [4]$
- $\boxed{8}$ $I(x)' = [1]$
- $\boxed{9}$ $d' = (-1.00; 0.00)$
- $\boxed{10}$ $d' = (1.00; -0.00)$
- ■ Pas de calcul de d'

Question 3 ♣

By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.

There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).

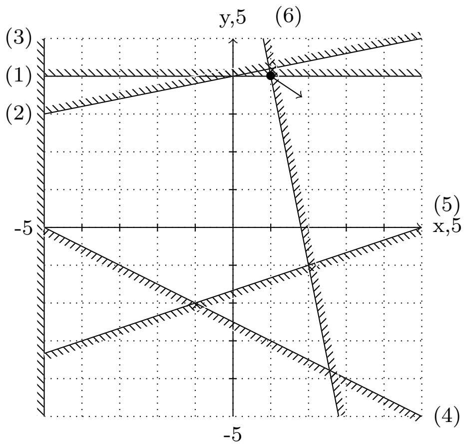
The • symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

■ $I(x) = [1, 4]$
2 $I(x) = [2, 4]$
3 $I(x) = [1, 2]$
4 $d = (0.60; 0.80)$
5 $d = (-0.60; -0.80)$
■ $d = \vec{0}$
7 Pas de calcul de λ_1, λ_4
8 $\lambda_1 = 0.08; \lambda_4 = 0.14$
■ $\lambda_1 = 0.08; \lambda_4 = -0.14$
10 $\lambda_1 = -0.08; \lambda_4 = 0.14$
11 $\lambda_1 = -0.08; \lambda_4 = -0.14$

Question 4 ♣
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;6]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.

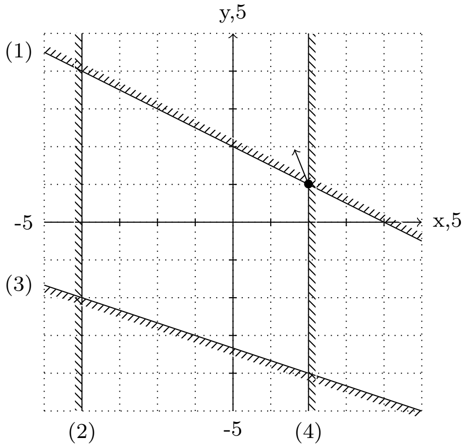


We apply one (only one) iteration of the projected gradient algorithm from x. We computed $I(x) = [1, 6]$ et $d = \vec{0}$. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- 1 Pas de calcul de λ_1, λ_6
- 2 $\lambda_1 = -0.72; \lambda_6 = 0.17$
- 3 $\lambda_1 = 0.72; \lambda_6 = 0.17$
- ■ $\lambda_1 = 0.72; \lambda_6 = -0.17$
- 5 $\lambda_1 = -0.72; \lambda_6 = -0.17$
- ■ $I(x)' = [1]$
- 7 Pas de calcul de $I(x)'$
- 8 $I(x)' = [6]$
- ■ $d' = (-0.83; 0.00)$
- 10 Pas de calcul de d'
- 11 $d' = (0.83; -0.00)$

Question 5 ♣

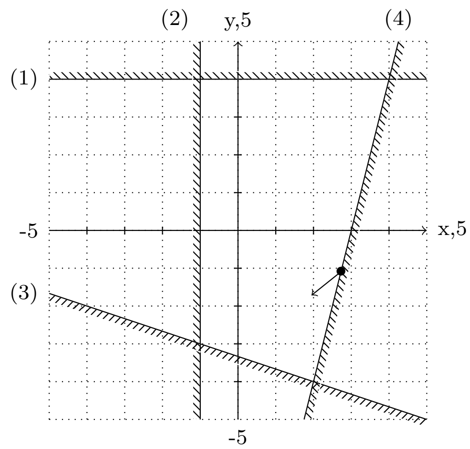
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- ■ $I(x) = [1, 4]$
- 2 $I(x) = [1, 3]$
- 3 $I(x) = [2, 3]$
- 4 $d = (0.89; -0.45)$
- ■ $d = \vec{0}$
- 6 $d = (-0.89; 0.45)$
- 7 Pas de calcul de λ_1, λ_4
- 8 $\lambda_1 = -0.46; \lambda_4 = -0.84$
- ■ $\lambda_1 = -0.46; \lambda_4 = 0.84$
- 10 $\lambda_1 = 0.46; \lambda_4 = 0.84$
- 11 $\lambda_1 = 0.46; \lambda_4 = -0.84$

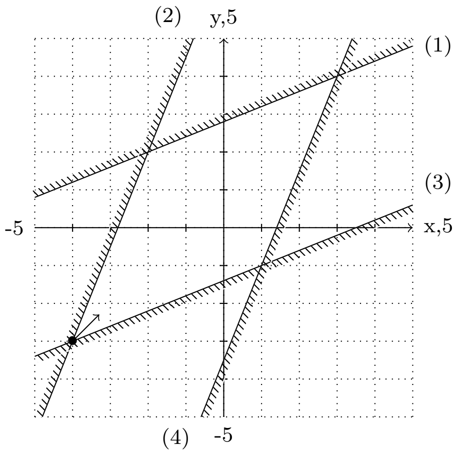
Question 6 ♣
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. We computed $I(x) = [4]$ et $d = (0.19, 0.77)$. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- [1] $\lambda_4 = 0.19$
- [2] $\lambda_4 = -0.19$
- ■ Pas de calcul de λ_4
- [4] $I(x)' = [1]$
- ■ Pas de calcul de $I(x)'$
- [6] $I(x)' = [4]$
- ■ Pas de calcul de d'
- [8] $d' = (-0.24; -0.97)$
- [9] $d' = (0.24; 0.97)$

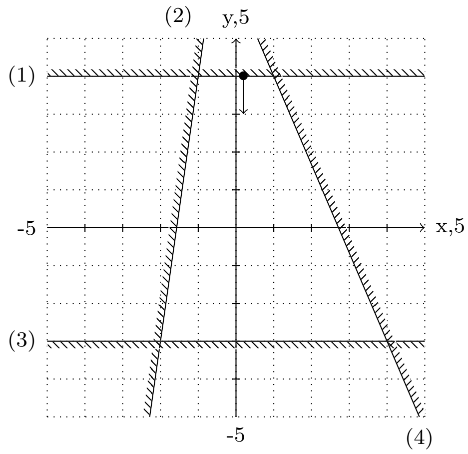
Question 7 ♣
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- ■ $I(x) = [2,3]$
- 2 $I(x) = [1]$
- 3 $I(x) = [1,2]$
- 4 $d = (-0.93; -0.37)$
- 5 $d = (0.93; 0.37)$
- ■ $d = \vec{0}$
- 7 Pas de calcul de λ_2, λ_3
- 8 $\lambda_2 = -0.24; \lambda_3 = -0.24$
- ■ $\lambda_2 = 0.24; \lambda_3 = 0.24$
- 10 $\lambda_2 = -0.24; \lambda_3 = 0.24$
- 11 $\lambda_2 = 0.24; \lambda_3 = -0.24$

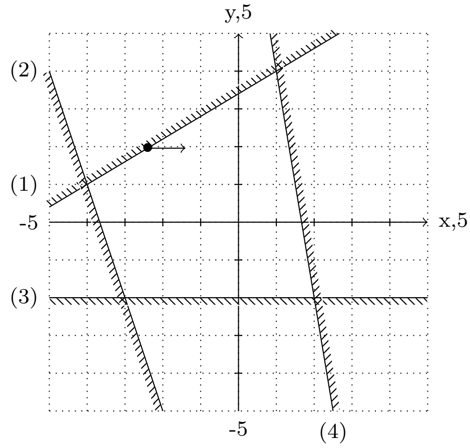
Question 8 ♣
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1; 4]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. We computed $I(x) = [1]$ et $d = \vec{0}$. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- ■ $\lambda_1 = 1.00$
- 2 Pas de calcul de λ_1
- 3 $\lambda_1 = -1.00$
- 4 $I(x)' = [1]$
- 5 $I(x)' = [2]$
- ■ Pas de calcul de $I(x)'$
- 7 $d' = (1.00; -0.00)$
- 8 $d' = (-1.00; 0.00)$
- ■ Pas de calcul de d'

Question 9 ♣
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.

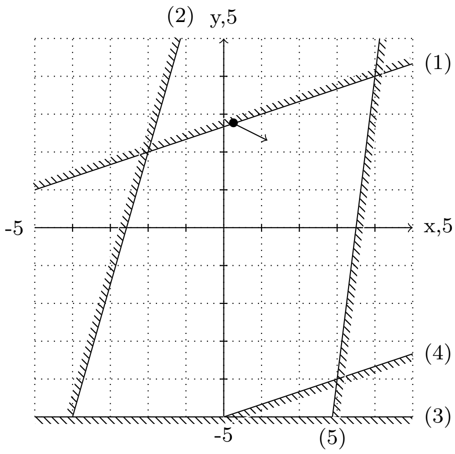


We apply one (only one) iteration of the projected gradient algorithm from x. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

■ $I(x) = [1]$
2 $I(x) = [4]$
3 $I(x) = [2]$
4 $d = (0.74; 0.44)$
5 $d = \vec{0}$
■ $d = (-0.74; -0.44)$
7 $\lambda_1 = 0.67$
8 $\lambda_1 = -0.67$
■ Pas de calcul de λ_1

Question 10 ♣

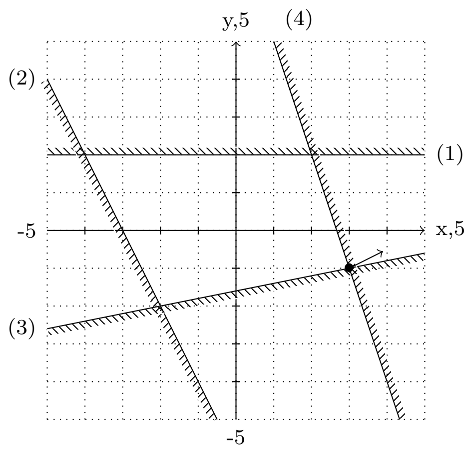
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;5]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The • symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. We computed $I(x) = [1]$ et $d = (-0.67, -0.22)$. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- $\boxed{1}$ $\lambda_1 = -0.96$
- ■ Pas de calcul de λ_1
- $\boxed{3}$ $\lambda_1 = 0.96$
- $\boxed{4}$ $I(x)' = [1]$
- ■ Pas de calcul de $I(x)'$
- $\boxed{6}$ $I(x)' = [3]$
- ■ Pas de calcul de d'
- $\boxed{8}$ $d' = (-0.95; -0.32)$
- $\boxed{9}$ $d' = (0.95; 0.32)$

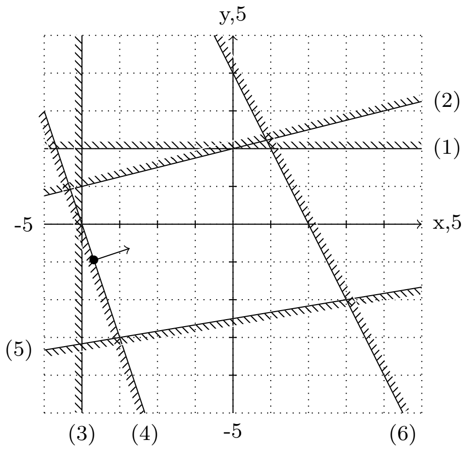
Question 11 ♣
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The • symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- ■ $I(x) = [3, 4]$
- 2 $I(x) = [1, 3]$
- 3 $I(x) = [1]$
- 4 $d = (0.32; -0.95)$
- 5 $d = (-0.32; 0.95)$
- ■ $d = \vec{0}$
- 7 Pas de calcul de λ_3, λ_4
- 8 $\lambda_3 = -0.03; \lambda_4 = -0.31$
- ■ $\lambda_3 = 0.03; \lambda_4 = -0.31$
- 10 $\lambda_3 = 0.03; \lambda_4 = 0.31$
- 11 $\lambda_3 = -0.03; \lambda_4 = 0.31$

Question 12 ♣
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;6]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. We computed $I(x) = [4]$ et $d = \vec{0}$. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

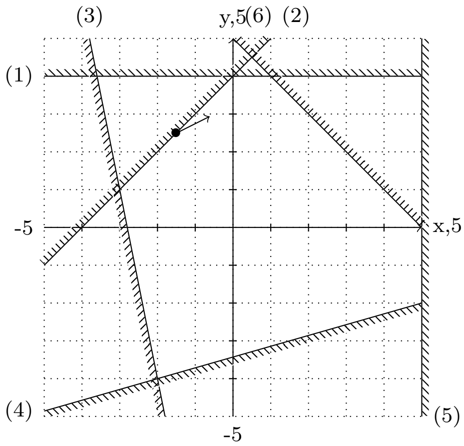
- ■ $\lambda_4 = 0.32$
- 2 Pas de calcul de λ_4
- 3 $\lambda_4 = -0.32$
- 4 $I(x)' = [6]$
- 5 $I(x)' = [4]$
- ■ Pas de calcul de $I(x)'$
- 7 $d' = (-0.32; 0.95)$
- ■ Pas de calcul de d'
- 9 $d' = (0.32; -0.95)$

Question 13 ♣

By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1; 6]\!]$, $g_i(x) \leq 0$.

There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).

The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.

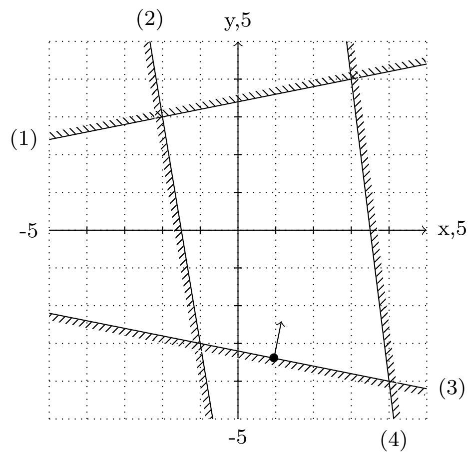


We apply one (only one) iteration of the projected gradient algorithm from x. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- ■ $I(x) = [2]$
- 2 $I(x) = [1, 5]$
- 3 $I(x) = [6]$
- 4 $d = (0.67; 0.67)$
- 5 $d = \vec{0}$
- ■ $d = (-0.67; -0.67)$
- ■ Pas de calcul de λ_2
- 8 $\lambda_2 = -0.05$
- 9 $\lambda_2 = 0.05$

Question 14 ♣

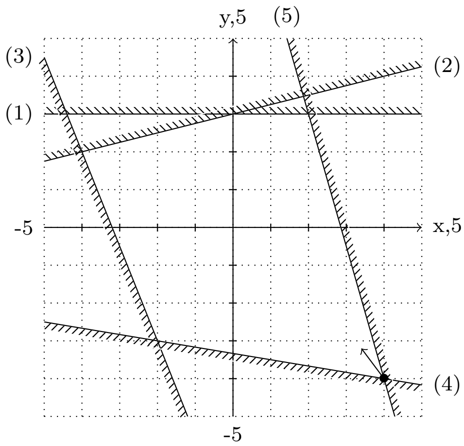
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. We computed $I(x) = [3]$ et $d = \vec{0}$. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- 1 $\lambda_3 = -0.20$
- ■ $\lambda_3 = 0.20$
- 3 Pas de calcul de λ_3
- ■ Pas de calcul de $I(x)'$
- 5 $I(x)' = [2]$
- 6 $I(x)' = [3]$
- 7 $d' = (0.98; -0.20)$
- 8 $d' = (-0.98; 0.20)$
- ■ Pas de calcul de d'

Question 15 ♣
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;5]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.

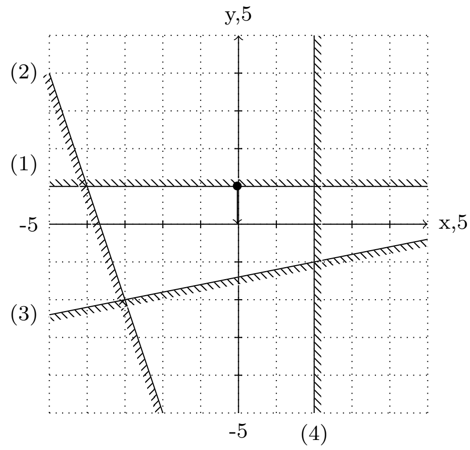


We apply one (only one) iteration of the projected gradient algorithm from x. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- [1] $I(x) = [1]$
- ■ $I(x) = [4, 5]$
- [3] $I(x) = [2]$
- [4] $d = (-0.27; 0.96)$
- [5] $d = (0.27; -0.96)$
- ■ $d = \vec{0}$
- ■ $\lambda_4 = 0.17; \lambda_5 = 0.11$
- [8] Pas de calcul de λ_4, λ_5
- [9] $\lambda_4 = -0.17; \lambda_5 = -0.11$
- [10] $\lambda_4 = 0.17; \lambda_5 = -0.11$
- [11] $\lambda_4 = -0.17; \lambda_5 = 0.11$

Question 16 ♣

By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.

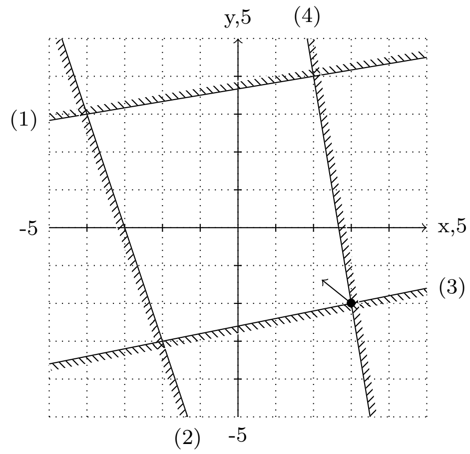


We apply one (only one) iteration of the projected gradient algorithm from x. We computed $I(x) = [1]$ et $d = \vec{0}$. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- 1 $\lambda_1 = -1.00$
- ■ $\lambda_1 = 1.00$
- 3 Pas de calcul de λ_1
- 4 $I(x)' = [3]$
- 5 $I(x)' = [1]$
- ■ Pas de calcul de $I(x)'$
- 7 $d' = (-1.00; 0.00)$
- 8 $d' = (1.00; -0.00)$
- ■ Pas de calcul de d'

Question 17 ♣

By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

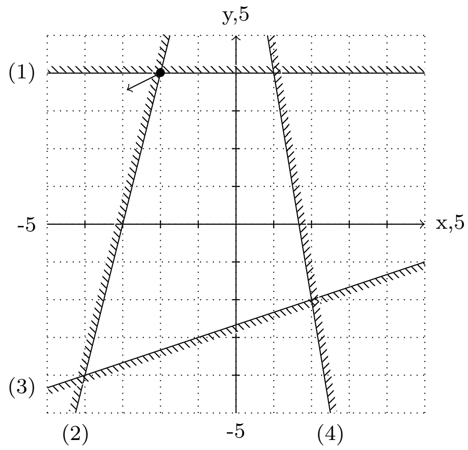
- 1 $I(x) = [1]$
- 2 $I(x) = [2]$
- ■ $I(x) = [3, 4]$
- 4 $d = (0.98; 0.20)$
- 5 $d = (-0.98; -0.20)$
- ■ $d = \vec{0}$
- ■ $\lambda_3 = 0.15; \lambda_4 = 0.11$
- 8 $\lambda_3 = -0.15; \lambda_4 = 0.11$
- 9 $\lambda_3 = -0.15; \lambda_4 = -0.11$
- 10 Pas de calcul de λ_3, λ_4
- 11 $\lambda_3 = 0.15; \lambda_4 = -0.11$

Question 18 ♣

By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.

There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).

The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. We computed $I(x) = [1, 2]$ et $d = \vec{0}$. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

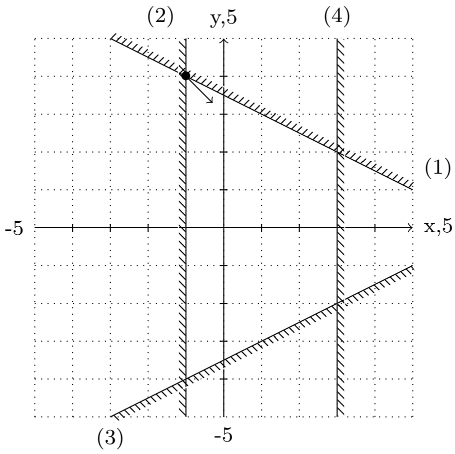
- ☐ 1 $\lambda_1 = 0.67; \lambda_2 = 0.22$
- ■ $\lambda_1 = 0.67; \lambda_2 = -0.22$
- ☐ 3 Pas de calcul de λ_1, λ_2
- ☐ 4 $\lambda_1 = -0.67; \lambda_2 = -0.22$
- ☐ 5 $\lambda_1 = -0.67; \lambda_2 = 0.22$
- ■ $I(x)' = [1]$
- ☐ 7 $I(x)' = [2]$
- ☐ 8 Pas de calcul de $I(x)'$
- ☐ 9 $d' = (-0.89; -0.00)$
- ■ $d' = (0.89; 0.00)$
- ☐ 11 Pas de calcul de d'

Question 19 ♣

By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1;4]\!]$, $g_i(x) \leq 0$.

There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).

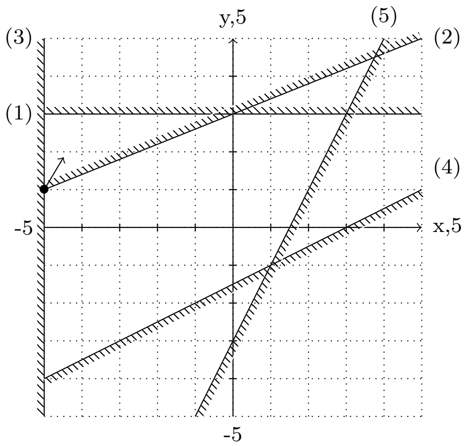
The • symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- $\boxed{1}$ $I(x) = [2, 3]$
- $\boxed{2}$ $I(x) = [1, 3]$
- ■ $I(x) = [1, 2]$
- $\boxed{4}$ $d = (0.00; 1.00)$
- ■ $d = \vec{0}$
- $\boxed{6}$ $d = (-0.00; -1.00)$
- $\boxed{7}$ $\lambda_1 = -0.35; \lambda_2 = 1.06$
- ■ $\lambda_1 = 0.35; \lambda_2 = 1.06$
- $\boxed{9}$ Pas de calcul de λ_1, λ_2
- $\boxed{10}$ $\lambda_1 = 0.35; \lambda_2 = -1.06$
- $\boxed{11}$ $\lambda_1 = -0.35; \lambda_2 = -1.06$

Question 20 ♣
By drawing the graphical representation of a non linear program with linear constraints and 2 variables, we get the following graphics. We want to minimize a function $f(x)$, for $x \in \mathbb{R}^2$, satisfying, for all $i \in [\![1; 5]\!]$, $g_i(x) \leq 0$.
There is no equality constraint, only inequalities represented by the edges of the polygon. For each constraint, the half-plane on the side with small dashed lines indicates on which side is the **non feasible** side. The constraint g_i is indicated on the drawing by the notation (i).
The $\bullet$ symbol indicates a feasible solution x of the program. The arrow going out of x is the gradient $\nabla f(x)$.



We apply one (only one) iteration of the projected gradient algorithm from x. We computed $I(x) = [2, 3]$ et $d = \vec{0}$. Check, in each of the answers below, all the properties that are true (considering that the drawing is true). We used the notation of the course.

- ☐ 1 Pas de calcul de λ_2, λ_3
- ☐ 2 $\lambda_2 = 0.17; \lambda_3 = -0.86$
- ■ $\lambda_2 = -0.17; \lambda_3 = 0.86$
- ☐ 4 $\lambda_2 = 0.17; \lambda_3 = 0.86$
- ☐ 5 $\lambda_2 = -0.17; \lambda_3 = -0.86$
- ☐ 6 $I(x)' = [2]$
- ■ $I(x)' = [3]$
- ☐ 8 Pas de calcul de $I(x)'$
- ■ $d' = (0.00; -0.86)$
- ☐ 10 $d' = (-0.00; 0.86)$
- ☐ 11 Pas de calcul de d'

Entraînement - Training

Noircissez complètement ci-dessous les 3 premières lettres de votre nom de famille et la première lettre de votre prénom. Par exemple, pour Jean Dupont, cochez J, D, U, P ; pour Henri Harley, cochez seulement H, A, R ; pour Bernard Ca, cochez seulement A, B, C.

Check entirely the 3 first letters of your lastname and the first letter of your firstname. For instance, for Jean Dupont, check J, D, U, P ; for Henri Harley, check only H, A, R ; for Bernard Ca, check only A, B, C.

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

Then write your lastname and firstname below.

Nom et prénom :

....

Les réponses aux questions sont à donner exclusivement sur cette feuille. Les réponses données sur les feuilles précédentes ne seront pas prises en compte. Pour cocher une case, il faut la **noircir complètement**. Vous pouvez effacer votre réponse à la gomme ou avec du blanc, attention à ne pas effacer la case à cocher. Si vous êtes dans l'impossibilité de corriger une erreur, cette page est dupliquée au verso ; vous pouvez alors barrer cette feuille ci et répondre au verso.

Question 1 : 1 2 ■ 4 5 ■ 7 8 ■

Question 2 : 1 2 3 4 ■ ■ 7 8 9 10 ■

Question 3 : ■ 2 3 4 5 ■ 7 8 ■ 10 11

Question 4 : 1 2 3 ■ 5 ■ 7 8 ■ 10 11

Question 5 : ■ 2 3 4 ■ 6 7 8 ■ 10 11

Question 6 : 1 2 ■ 4 ■ 6 ■ 8 9

Question 7 : ■ 2 3 4 5 ■ 7 8 ■ 10 11

Question 8 : ■ 2 3 4 5 ■ 7 8 ■

Question 9 : ■ 2 3 4 5 ■ 7 8 ■

Question 10 : 1 ■ 3 4 ■ 6 ■ 8 9

Question 11 : ■ 2 3 4 5 ■ 7 8 ■ 10 11

Question 12 : ■ 2 3 4 5 ■ 7 ■ 9

Question 13 : ■ 2 3 4 5 ■ ■ 8 9

QUESTION 14 : 1 ■ 3 ■ 5 6 7 8 ■

QUESTION 15 : 1 ■ 3 4 5 ■ ■ 8 9 10 11

QUESTION 16 : 1 ■ 3 4 5 ■ 7 8 ■

QUESTION 17 : 1 2 ■ 4 5 ■ ■ 8 9 10 11

QUESTION 18 : 1 ■ 3 4 5 ■ 7 8 9 ■ 11

QUESTION 19 : 1 2 ■ 4 ■ 6 7 ■ 9 10 11

QUESTION 20 : 1 2 ■ 4 5 6 ■ 8 ■ 10 11