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

We apply the reduced gradient algorithm on a non linear program with linear constraints and 4 positive variables, and 2 equality constraints. We apply the algorithm starting at $x = \begin{pmatrix} 0 \\ 2 \\ 8 \\ 0 \end{pmatrix}$; with the basis $B = (2, 3)$.

$\nabla f(x) = \begin{pmatrix} -3 \\ 10 \\ -8 \\ -5 \end{pmatrix}$, $A_B^{-1} = \begin{pmatrix} -1 & 1 \\ -1 & -1 \end{pmatrix}$, $A_N = \begin{pmatrix} -1 & 0 \\ -1 & -1 \end{pmatrix}$

Comput the direction d followed by the algorith during that iteration.

[1] $\begin{pmatrix} -3 \\ 17 \\ 21 \\ 6 \end{pmatrix}$ [2] $\begin{pmatrix} -3 \\ 20 \\ 15 \\ 6 \end{pmatrix}$ [3] $\begin{pmatrix} 6 \\ 8 \\ 12 \\ -15 \end{pmatrix}$ [4] $\begin{pmatrix} 19 \\ -30 \\ -12 \\ 27 \end{pmatrix}$ [5] $\begin{pmatrix} 19 \\ 12 \\ -23 \\ 27 \end{pmatrix}$ [6] $\begin{pmatrix} 19 \\ 21 \\ 19 \\ 27 \end{pmatrix}$ [7] $\begin{pmatrix} -3 \\ -5 \\ -5 \\ 6 \end{pmatrix}$ [8] $\begin{pmatrix} 6 \\ -9 \\ -21 \\ -15 \end{pmatrix}$ [9] $\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$ [10] $\begin{pmatrix} 6 \\ -20 \\ 20 \\ -15 \end{pmatrix}$

Question 2

We apply the reduced gradient algorithm on a non linear program with linear constraints and 4 positive variables, and 2 equality constraints. We apply the algorithm starting at $x = \begin{pmatrix} 4 \\ 0 \\ 4 \\ 0 \end{pmatrix}$; with the basis $B = (1, 3)$.

$\nabla f(x) = \begin{pmatrix} -5 \\ -10 \\ 3 \\ 8 \end{pmatrix}$, $A_B^{-1} = \begin{pmatrix} -1 & -2 \\ -2 & -1 \end{pmatrix}$, $A_N = \begin{pmatrix} 1 & -2 \\ -1 & 1 \end{pmatrix}$

Comput the direction d followed by the algorith during that iteration.

1 $\begin{pmatrix} -16 \\ -13 \\ -18 \\ -5 \end{pmatrix}$ 3 $\begin{pmatrix} -12 \\ 2 \\ -30 \\ 1 \end{pmatrix}$ 5 $\begin{pmatrix} -7 \\ -13 \\ 16 \\ -5 \end{pmatrix}$ 7 $\begin{pmatrix} 2 \\ 2 \\ -9 \\ 1 \end{pmatrix}$ 9 $\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$

2 $\begin{pmatrix} 3 \\ 11 \\ 6 \\ -19 \end{pmatrix}$ 4 $\begin{pmatrix} -2 \\ 2 \\ -1 \\ 1 \end{pmatrix}$ 6 $\begin{pmatrix} 5 \\ 11 \\ -2 \\ -19 \end{pmatrix}$ 8 $\begin{pmatrix} 0 \\ -13 \\ 5 \\ -5 \end{pmatrix}$ 10 $\begin{pmatrix} -22 \\ 11 \\ 11 \\ -19 \end{pmatrix}$

Question 3

We apply the reduced gradient algorithm on a non linear program with linear constraints and 4 positive variables, and 2 equality constraints. We apply the algorithm starting at $x = \begin{pmatrix} 3 \\ 4 \\ 0 \\ 0 \end{pmatrix}$; with the basis $B = (1, 2)$.

$\nabla f(x) = \begin{pmatrix} 8 \\ 4 \\ 8 \\ -1 \end{pmatrix}$, $A_B^{-1} = \begin{pmatrix} -2 & 1 \\ -2 & -2 \end{pmatrix}$, $A_N = \begin{pmatrix} 1 & 2 \\ 2 & -2 \end{pmatrix}$

Comput the direction d followed by the algorith during that iteration.

$\boxed{1}$ $\begin{pmatrix} 26 \\ 11 \\ 10 \\ 13 \end{pmatrix}$ $\boxed{2}$ $\begin{pmatrix} -13 \\ 17 \\ -20 \\ 28 \end{pmatrix}$ $\boxed{3}$ $\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$ $\boxed{4}$ $\begin{pmatrix} -5 \\ -11 \\ -1 \\ -20 \end{pmatrix}$ $\boxed{5}$ $\begin{pmatrix} -27 \\ -23 \\ -1 \\ -20 \end{pmatrix}$ $\boxed{6}$ $\begin{pmatrix} 17 \\ 17 \\ -20 \\ 28 \end{pmatrix}$ $\boxed{7}$ $\begin{pmatrix} -26 \\ 12 \\ -1 \\ -20 \end{pmatrix}$ $\boxed{8}$ $\begin{pmatrix} -24 \\ -11 \\ 10 \\ 13 \end{pmatrix}$ $\boxed{9}$ $\begin{pmatrix} 28 \\ -3 \\ -20 \\ 28 \end{pmatrix}$ $\boxed{10}$ $\begin{pmatrix} 22 \\ -20 \\ 10 \\ 13 \end{pmatrix}$

Question 4

We apply the reduced gradient algorithm on a non linear program with linear constraints and 4 positive variables, and 2 equality constraints. We apply the algorithm starting at $x = \begin{pmatrix} 0 \\ 0 \\ 10 \\ 0 \end{pmatrix}$; with the basis $B = (3, 4)$.

$\nabla f(x) = \begin{pmatrix} -5 \\ 1 \\ 6 \\ -6 \end{pmatrix}$, $A_B^{-1} = \begin{pmatrix} 0 & 2 \\ -2 & 0 \end{pmatrix}$, $A_N = \begin{pmatrix} 0 & -2 \\ -1 & 1 \end{pmatrix}$

Comput the direction d followed by the algorith during that iteration.

[1] $\begin{pmatrix} -20 \\ -20 \\ -4 \\ 22 \end{pmatrix}$	[3] $\begin{pmatrix} -26 \\ -12 \\ -25 \\ -16 \end{pmatrix}$	[5] $\begin{pmatrix} -20 \\ -20 \\ -30 \\ -12 \end{pmatrix}$	[7] $\begin{pmatrix} -26 \\ -12 \\ -6 \\ 29 \end{pmatrix}$	[9] $\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$
[2] $\begin{pmatrix} 4 \\ -27 \\ -21 \\ 13 \end{pmatrix}$	[4] $\begin{pmatrix} 4 \\ -27 \\ -26 \\ -9 \end{pmatrix}$	[6] $\begin{pmatrix} 4 \\ -27 \\ -30 \\ 23 \end{pmatrix}$	[8] $\begin{pmatrix} -26 \\ -12 \\ 29 \\ 2 \end{pmatrix}$	[10] $\begin{pmatrix} -20 \\ -20 \\ -30 \\ -25 \end{pmatrix}$

Question 5

We apply the reduced gradient algorithm on a non linear program with linear constraints and 4 positive variables, and 2 equality constraints. We apply the algorithm starting at $x = \begin{pmatrix} 10 \\ 4 \\ 8 \\ 0 \end{pmatrix}$; with the basis $B = (2, 3)$.

$\nabla f(x) = \begin{pmatrix} 7 \\ 4 \\ -4 \\ 9 \end{pmatrix}$, $A_B^{-1} = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$, $A_N = \begin{pmatrix} 1 & -2 \\ -2 & -2 \end{pmatrix}$

Comput the direction d followed by the algorith during that iteration.

[1] $\begin{pmatrix} 19 \\ 28 \\ -4 \\ -3 \end{pmatrix}$ [3] $\begin{pmatrix} 11 \\ -2 \\ 26 \\ -30 \end{pmatrix}$ [5] $\begin{pmatrix} 5 \\ -28 \\ 5 \\ 0 \end{pmatrix}$ [7] $\begin{pmatrix} 19 \\ -7 \\ -18 \\ -3 \end{pmatrix}$ [9] $\begin{pmatrix} 5 \\ 29 \\ -11 \\ 0 \end{pmatrix}$

[2] $\begin{pmatrix} 11 \\ 13 \\ 6 \\ -30 \end{pmatrix}$ [4] $\begin{pmatrix} 11 \\ 16 \\ -25 \\ -30 \end{pmatrix}$ [6] $\begin{pmatrix} 19 \\ -14 \\ -8 \\ -3 \end{pmatrix}$ [8] $\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$ [10] $\begin{pmatrix} 5 \\ 0 \\ 15 \\ 0 \end{pmatrix}$

Question 6

We apply the reduced gradient algorithm on a non linear program with linear constraints and 4 positive variables, and 2 equality constraints. We apply the algorithm starting at $x = \begin{pmatrix} 3 \\ 9 \\ 0 \\ 0 \end{pmatrix}$; with the basis $B = (1, 2)$.

$\nabla f(x) = \begin{pmatrix} -3 \\ 0 \\ 2 \\ 10 \end{pmatrix}$, $A_B^{-1} = \begin{pmatrix} 1 & 2 \\ -1 & 0 \end{pmatrix}$, $A_N = \begin{pmatrix} 0 & -1 \\ 2 & -2 \end{pmatrix}$

Comput the direction d followed by the algorith during that iteration.

[1] $\begin{pmatrix} 1 \\ 8 \\ 10 \\ -14 \end{pmatrix}$ [3] $\begin{pmatrix} 22 \\ 25 \\ -26 \\ 4 \end{pmatrix}$ [5] $\begin{pmatrix} -17 \\ 0 \\ -26 \\ 4 \end{pmatrix}$ [7] $\begin{pmatrix} 18 \\ -12 \\ 10 \\ -14 \end{pmatrix}$ [9] $\begin{pmatrix} -24 \\ 8 \\ 0 \\ 5 \end{pmatrix}$

[2] $\begin{pmatrix} -24 \\ 19 \\ 0 \\ 5 \end{pmatrix}$ [4] $\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$ [6] $\begin{pmatrix} -18 \\ -23 \\ -26 \\ 4 \end{pmatrix}$ [8] $\begin{pmatrix} 16 \\ -20 \\ 10 \\ -14 \end{pmatrix}$ [10] $\begin{pmatrix} 25 \\ -5 \\ 0 \\ 5 \end{pmatrix}$

Question 7

We apply the reduced gradient algorithm on a non linear program with linear constraints and 4 positive variables, and 2 equality constraints. We apply the algorithm starting at $x = \begin{pmatrix} 0 \\ 3 \\ 0 \\ 0 \end{pmatrix}$; with the basis $B = (1, 2)$.

$\nabla f(x) = \begin{pmatrix} -10 \\ 9 \\ 9 \\ -1 \end{pmatrix}$, $A_B^{-1} = \begin{pmatrix} -1 & -2 \\ 0 & -2 \end{pmatrix}$, $A_N = \begin{pmatrix} -2 & 0 \\ 1 & -1 \end{pmatrix}$

Comput the direction d followed by the algorith during that iteration.

[1] $\begin{pmatrix} -21 \\ -6 \\ -5 \\ 3 \end{pmatrix}$ [3] $\begin{pmatrix} 21 \\ -3 \\ 14 \\ -15 \end{pmatrix}$ [5] $\begin{pmatrix} -12 \\ 4 \\ -5 \\ 3 \end{pmatrix}$ [7] $\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$ [9] $\begin{pmatrix} 1 \\ 14 \\ 25 \\ -8 \end{pmatrix}$

[2] $\begin{pmatrix} -19 \\ -29 \\ 25 \\ -8 \end{pmatrix}$ [4] $\begin{pmatrix} -4 \\ -10 \\ 14 \\ -15 \end{pmatrix}$ [6] $\begin{pmatrix} 4 \\ -16 \\ -5 \\ 3 \end{pmatrix}$ [8] $\begin{pmatrix} 12 \\ 16 \\ 14 \\ -15 \end{pmatrix}$ [10] $\begin{pmatrix} -19 \\ -8 \\ 25 \\ -8 \end{pmatrix}$

Question 8

We apply the reduced gradient algorithm on a non linear program with linear constraints and 4 positive variables, and 2 equality constraints. We apply the algorithm starting at $x = \begin{pmatrix} 7 \\ 0 \\ 0 \\ 1 \end{pmatrix}$; with the basis $B = (1, 4)$.

$\nabla f(x) = \begin{pmatrix} 9 \\ 10 \\ -7 \\ 4 \end{pmatrix}$, $A_B^{-1} = \begin{pmatrix} -2 & 1 \\ -2 & 0 \end{pmatrix}$, $A_N = \begin{pmatrix} 1 & 2 \\ -2 & 1 \end{pmatrix}$

Comput the direction d followed by the algorith during that iteration.

1 $\begin{pmatrix} 5 \\ 2 \\ 0 \\ -17 \end{pmatrix}$	3 $\begin{pmatrix} 20 \\ 2 \\ 0 \\ -16 \end{pmatrix}$	5 $\begin{pmatrix} 1 \\ 26 \\ -22 \\ 8 \end{pmatrix}$	7 $\begin{pmatrix} -12 \\ 2 \\ 0 \\ 15 \end{pmatrix}$	9 $\begin{pmatrix} 15 \\ 26 \\ -22 \\ 9 \end{pmatrix}$
2 $\begin{pmatrix} 10 \\ 20 \\ -1 \\ -5 \end{pmatrix}$	4 $\begin{pmatrix} -10 \\ 20 \\ -1 \\ 23 \end{pmatrix}$	6 $\begin{pmatrix} -13 \\ 26 \\ -22 \\ -2 \end{pmatrix}$	8 $\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$	10 $\begin{pmatrix} 14 \\ 20 \\ -1 \\ 2 \end{pmatrix}$

Question 9

We apply the reduced gradient algorithm on a non linear program with linear constraints and 4 positive variables, and 2 equality constraints. We apply the algorithm starting at $x = \begin{pmatrix} 0 \\ 2 \\ 0 \\ 3 \end{pmatrix}$; with the basis $B = (2, 3)$.

$\nabla f(x) = \begin{pmatrix} 7 \\ 7 \\ 1 \\ 10 \end{pmatrix}$, $A_B^{-1} = \begin{pmatrix} 0 & 2 \\ 1 & 1 \end{pmatrix}$, $A_N = \begin{pmatrix} -2 & -2 \\ 1 & 0 \end{pmatrix}$

Comput the direction d followed by the algorith during that iteration.

1 $\begin{pmatrix} 29 \\ 9 \\ 12 \\ 20 \end{pmatrix}$ 3 $\begin{pmatrix} 29 \\ 22 \\ 28 \\ 20 \end{pmatrix}$ 5 $\begin{pmatrix} -13 \\ -19 \\ -26 \\ -18 \end{pmatrix}$ 7 $\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$ 9 $\begin{pmatrix} -13 \\ -18 \\ -27 \\ -18 \end{pmatrix}$

2 $\begin{pmatrix} 29 \\ -28 \\ 21 \\ 20 \end{pmatrix}$ 4 $\begin{pmatrix} 6 \\ 6 \\ -22 \\ -12 \end{pmatrix}$ 6 $\begin{pmatrix} 6 \\ -12 \\ -18 \\ -12 \end{pmatrix}$ 8 $\begin{pmatrix} 6 \\ 17 \\ 2 \\ -12 \end{pmatrix}$ 10 $\begin{pmatrix} -13 \\ 30 \\ -21 \\ -18 \end{pmatrix}$

Question 10

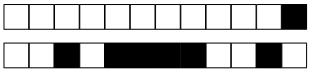
We apply the reduced gradient algorithm on a non linear program with linear constraints and 4 positive variables, and 2 equality constraints. We apply the algorithm starting at $x = \begin{pmatrix} 7 \\ 0 \\ 6 \\ 0 \end{pmatrix}$; with the basis $B = (1, 3)$.

$\nabla f(x) = \begin{pmatrix} -5 \\ -3 \\ -8 \\ -3 \end{pmatrix}$, $A_B^{-1} = \begin{pmatrix} 0 & -2 \\ 1 & 1 \end{pmatrix}$, $A_N = \begin{pmatrix} 2 & 1 \\ 1 & -1 \end{pmatrix}$

Comput the direction d followed by the algorith during that iteration.

1 $\begin{pmatrix} -19 \\ 8 \\ -23 \\ -18 \end{pmatrix}$ 3 $\begin{pmatrix} -12 \\ 2 \\ 17 \\ 23 \end{pmatrix}$ 5 $\begin{pmatrix} -11 \\ 8 \\ 28 \\ -18 \end{pmatrix}$ 7 $\begin{pmatrix} 22 \\ 4 \\ 23 \\ 7 \end{pmatrix}$ 9 $\begin{pmatrix} -26 \\ 4 \\ 10 \\ 7 \end{pmatrix}$

2 $\begin{pmatrix} 22 \\ 8 \\ -21 \\ -18 \end{pmatrix}$ 4 $\begin{pmatrix} 15 \\ 2 \\ -19 \\ 23 \end{pmatrix}$ 6 $\begin{pmatrix} 18 \\ 4 \\ 21 \\ 7 \end{pmatrix}$ 8 $\begin{pmatrix} 30 \\ 2 \\ -16 \\ 23 \end{pmatrix}$ 10 $\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$



+1/11/50+

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	3	4	5	6	7	8	9	10
Question 2 :	1	2	3	4	5	6	7	8	9	10
Question 3 :	1	2	3	4	5	6	7	8	9	10
Question 4 :	1	2	3	4	5	6	7	8	9	10
Question 5 :	1	2	3	4	5	6	7	8	9	10
Question 6 :	1	2	3	4	5	6	7	8	9	10
Question 7 :	1	2	3	4	5	6	7	8	9	10
Question 8 :	1	2	3	4	5	6	7	8	9	10
Question 9 :	1	2	3	4	5	6	7	8	9	10
Question 10 :	1	2	3	4	5	6	7	8	9	10