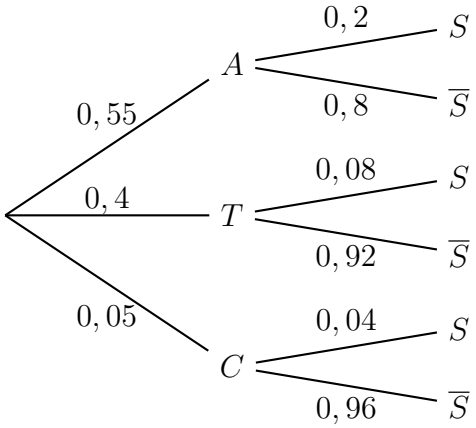
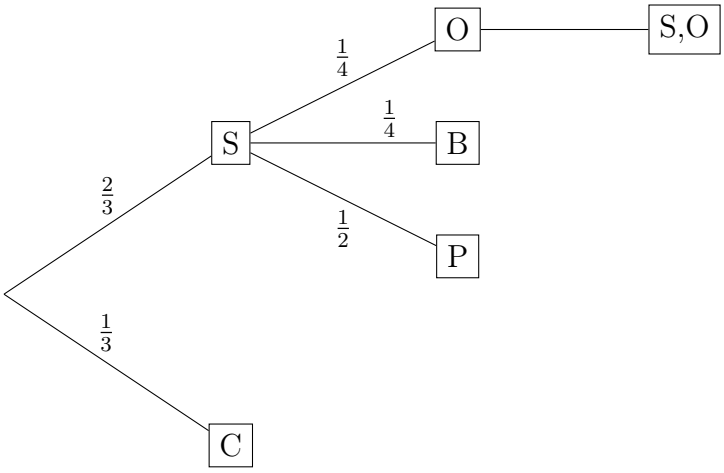
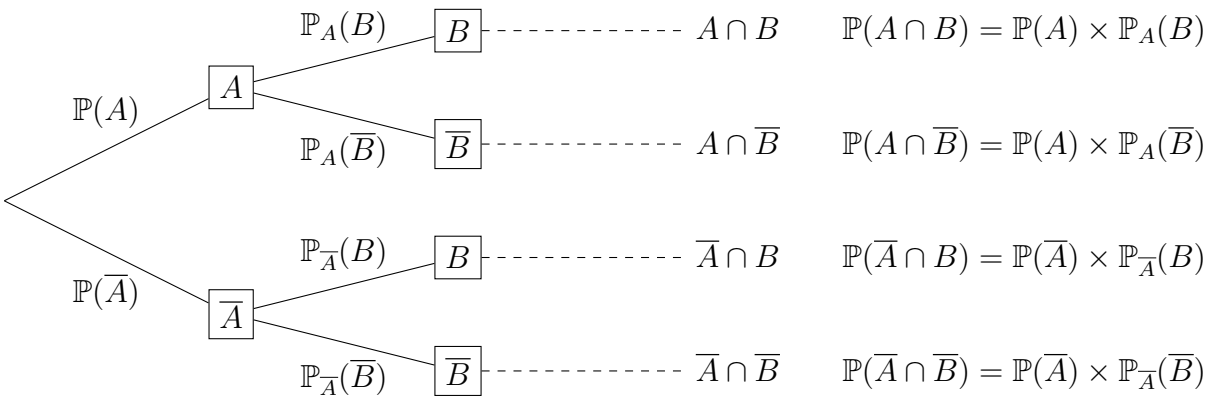
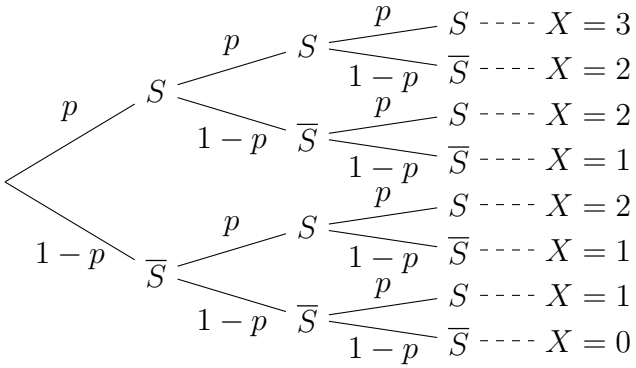
1 Arbres de probabilités

1.1 Arbres horizontaux pondérés









2 Analyse

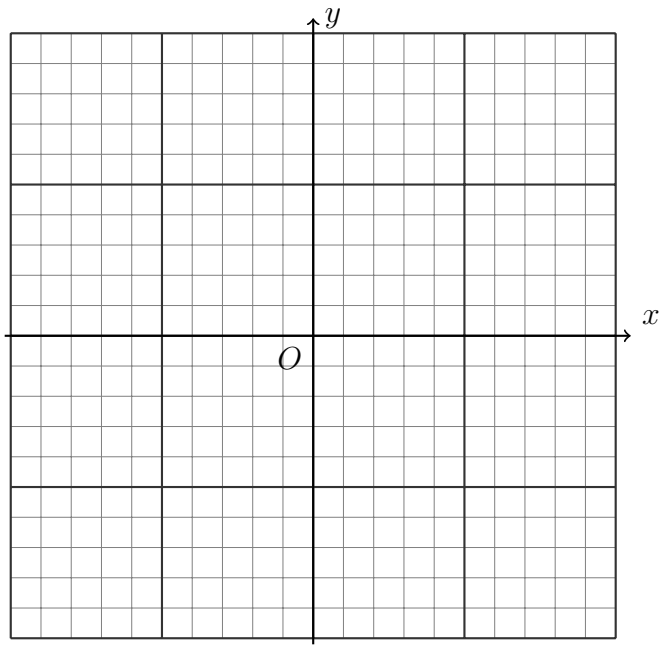
2.1 Tableaux de variation

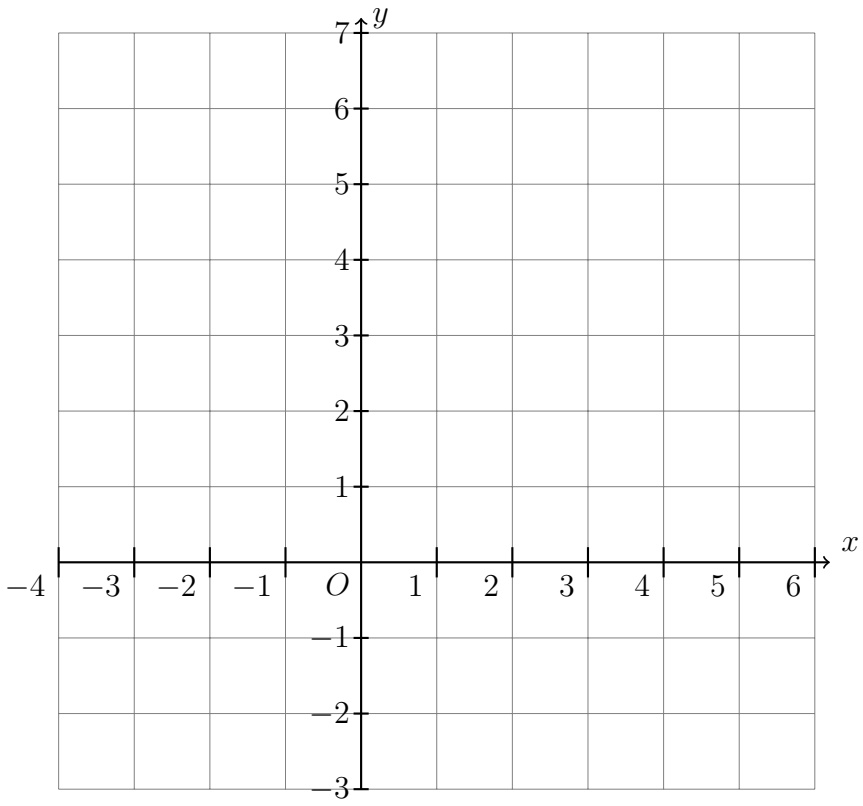
x	0		2		$+\infty$
Signe de $f'(x)$	‖	$-$	0	$+$	
variations de f	‖	↘	$2,4\ln(2)$	↗	

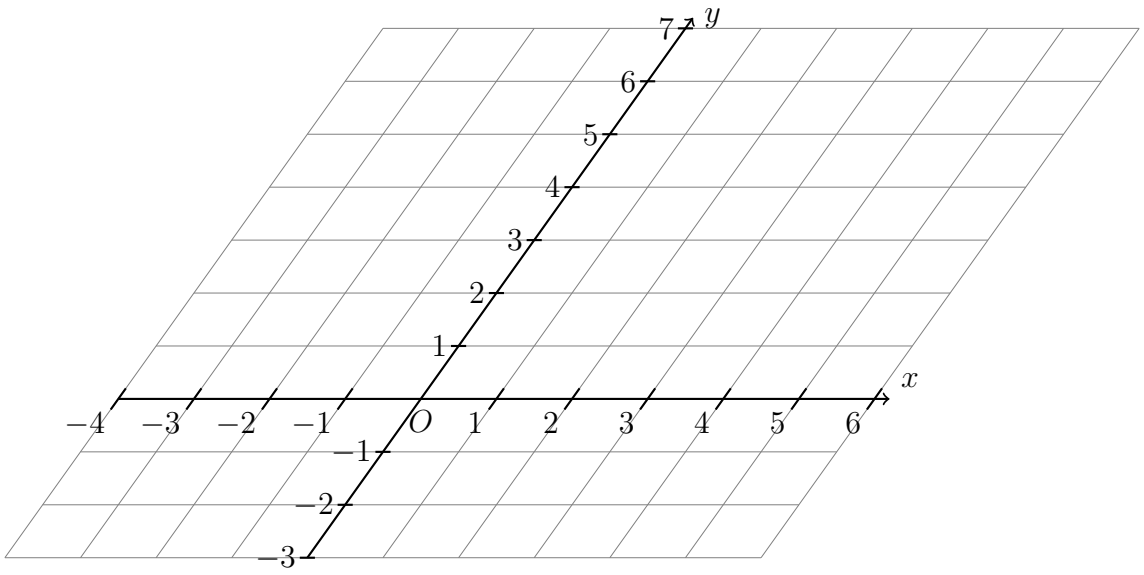
2.2 Tableaux de signes

x	0		3		15		21
-6		$-$		$-$		$-$	
$x-3$		$-$	0	$+$		$+$	
$x-15$		$-$		$-$	0	$+$	
signe de $B'(x)$		$-$	0	$+$	0	$-$	

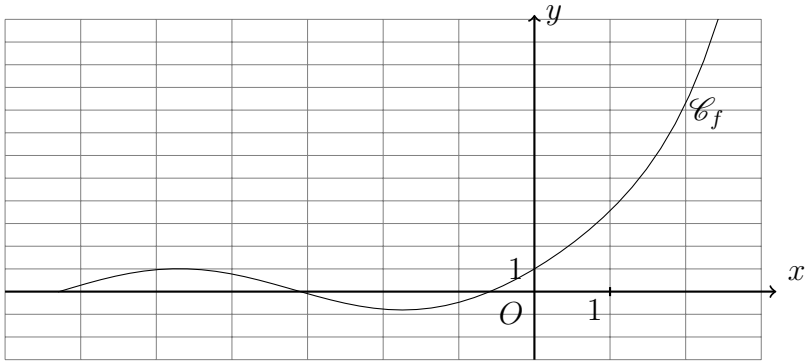
2.3 Repères

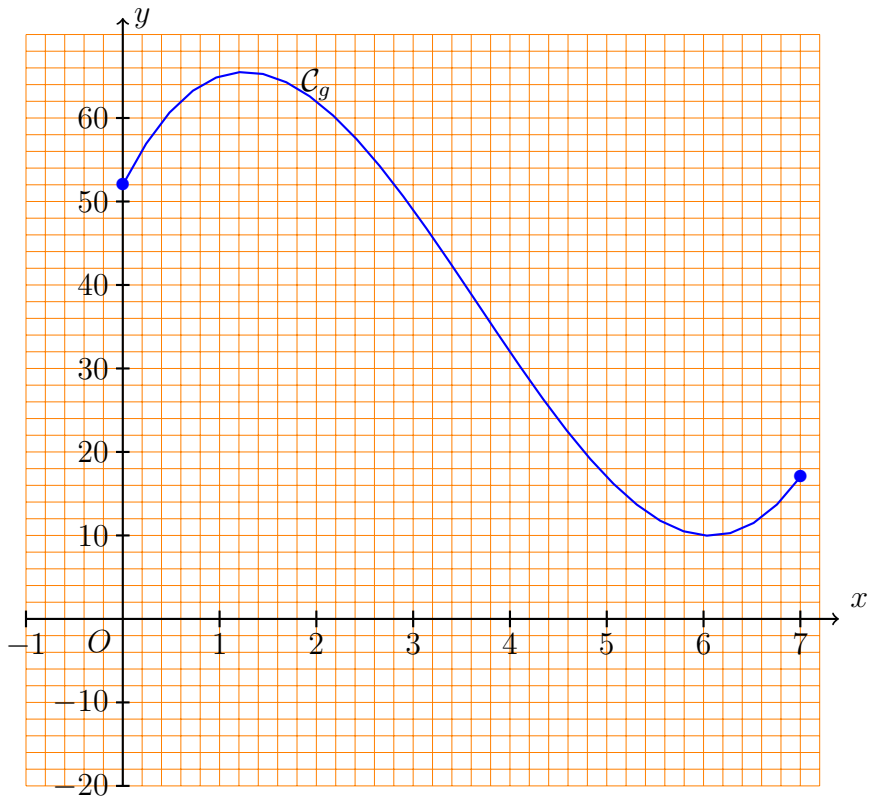


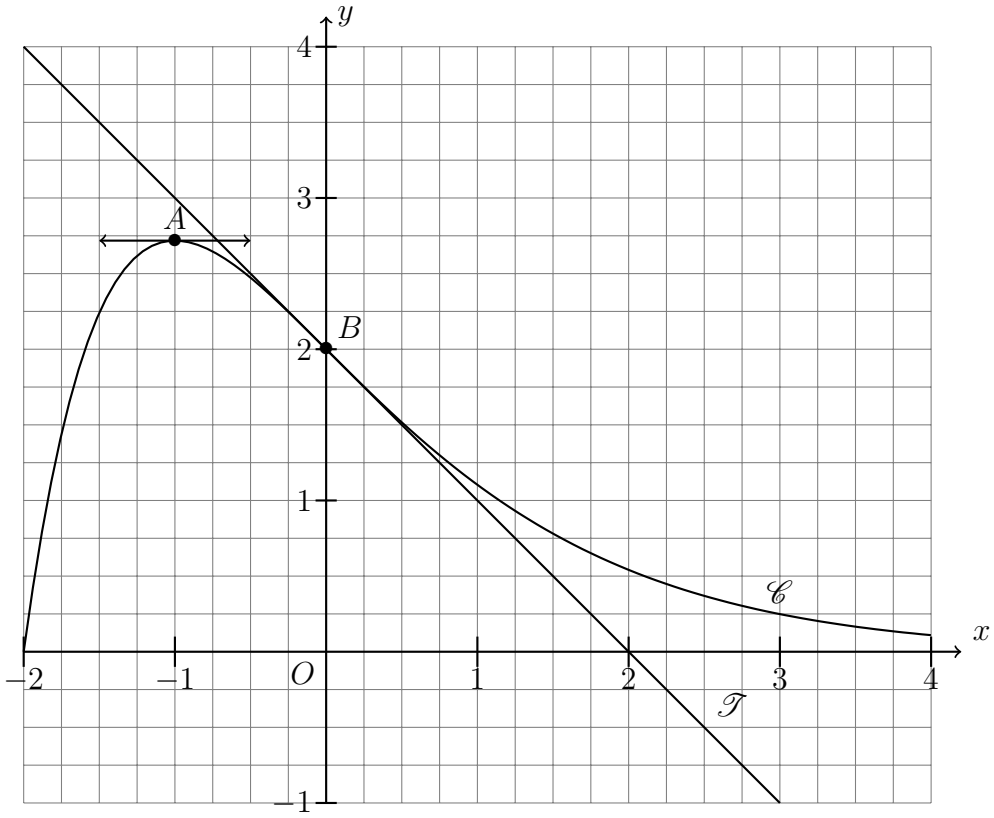


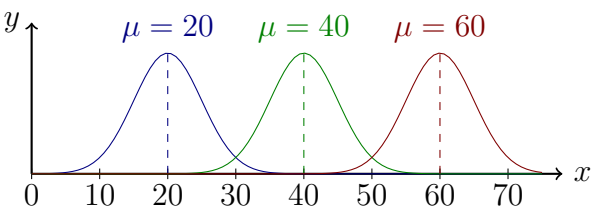


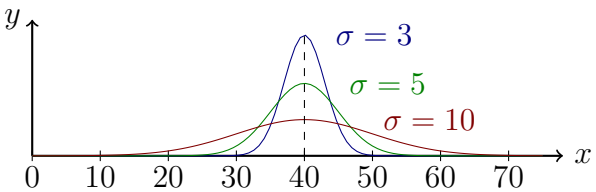
2.4 Courbe de fonction



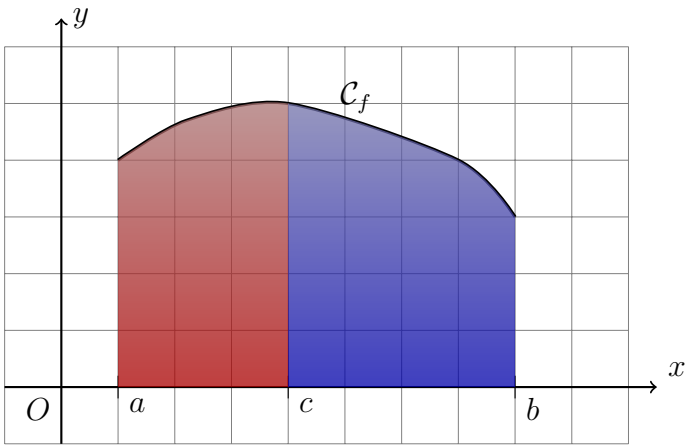

y
$\mathcal{C}_g$
60
50
40
30
20
10
-10
-20
x
-1
O
1
2
3
4
5
6
7

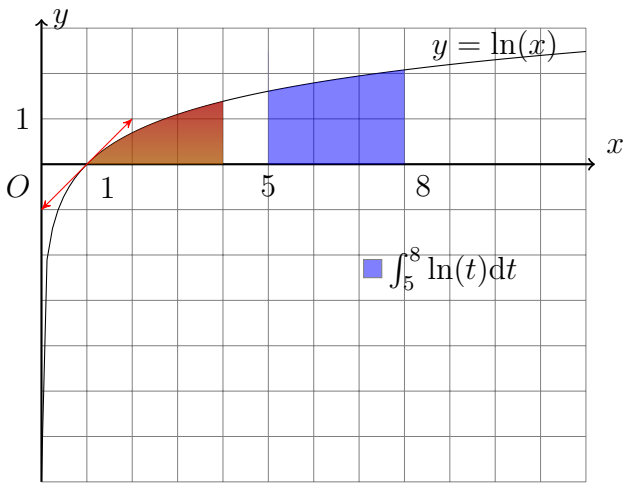

y
4
3
A
B
2
1
-1
$\mathscr{C}$
x
-2
-1
O
1
2
3
4
$\mathscr{T}$


y
$\mu = 20$
$\mu = 40$
$\mu = 60$
x
0
10
20
30
40
50
60
70

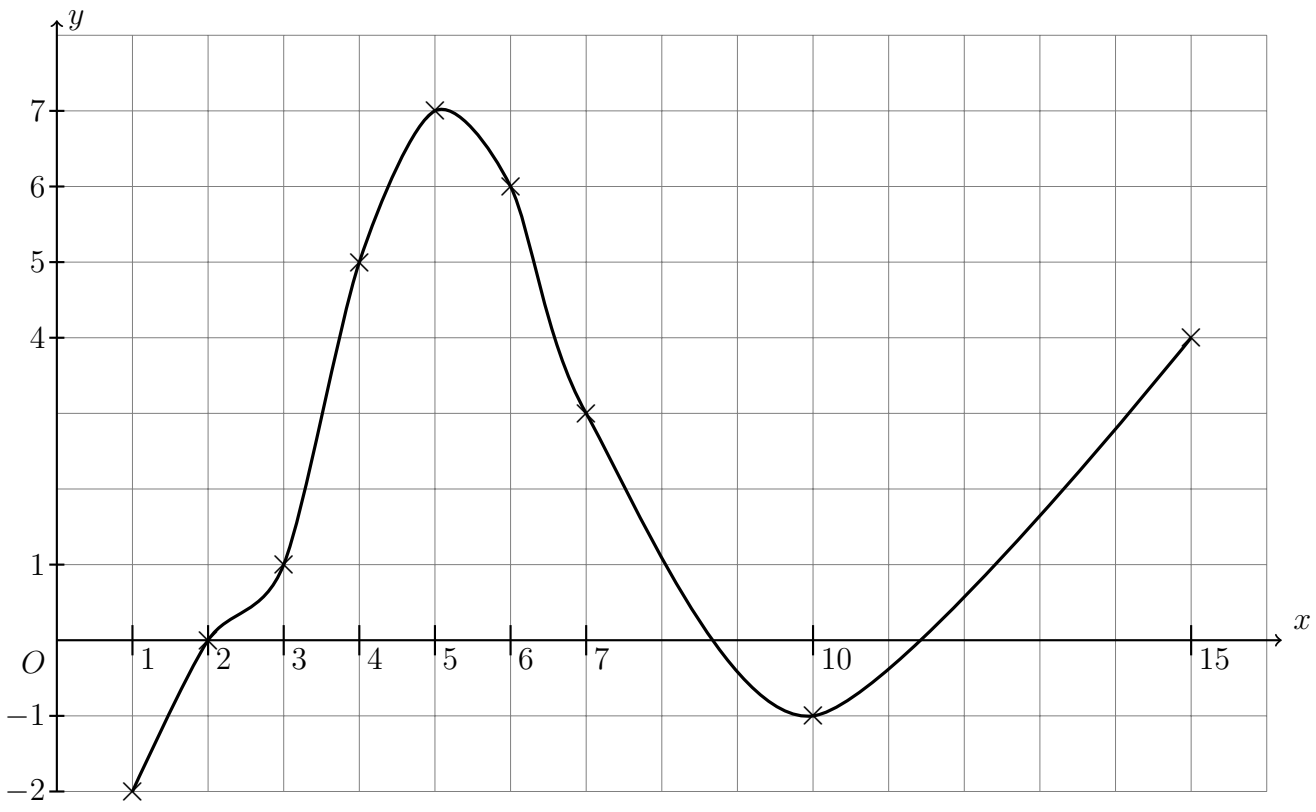

y
$\sigma = 3$
$\sigma = 5$
$\sigma = 10$
x
0
10
20
30
40
50
60
70

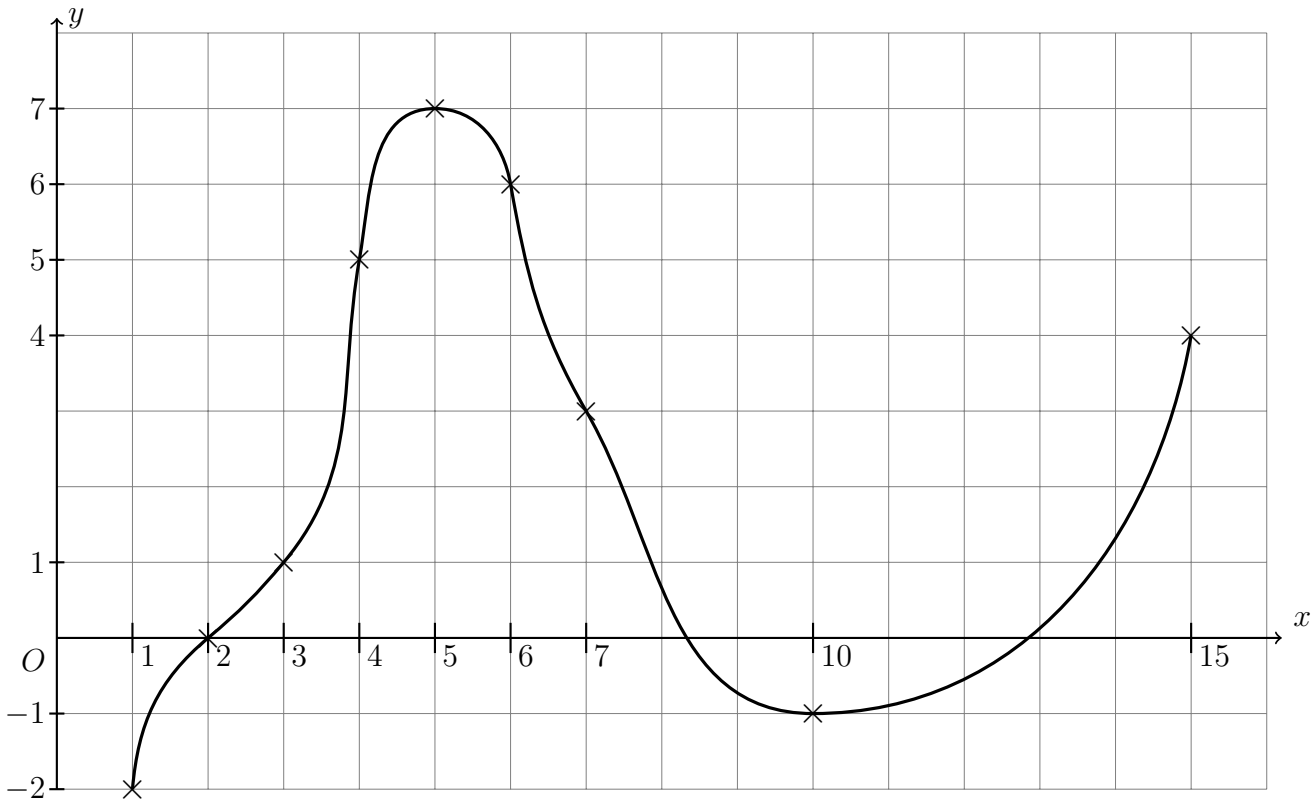
2.5 Intégrale



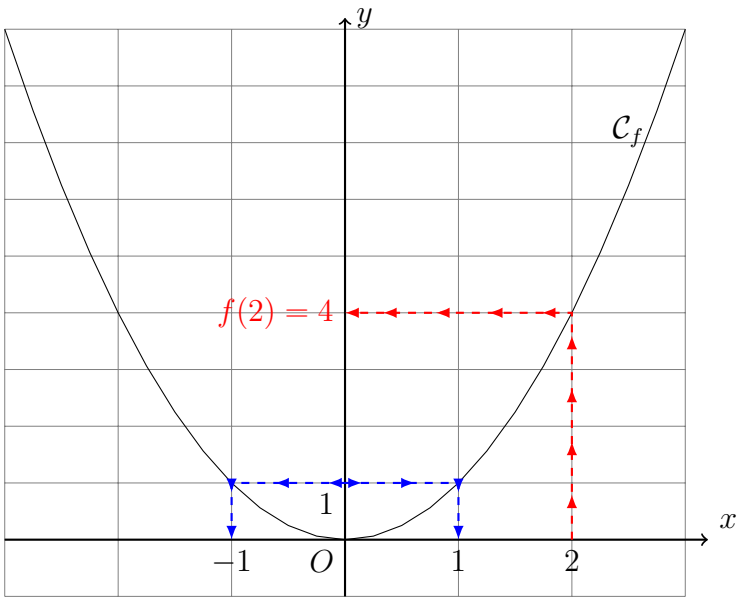


2.6 Courbe passant par des points

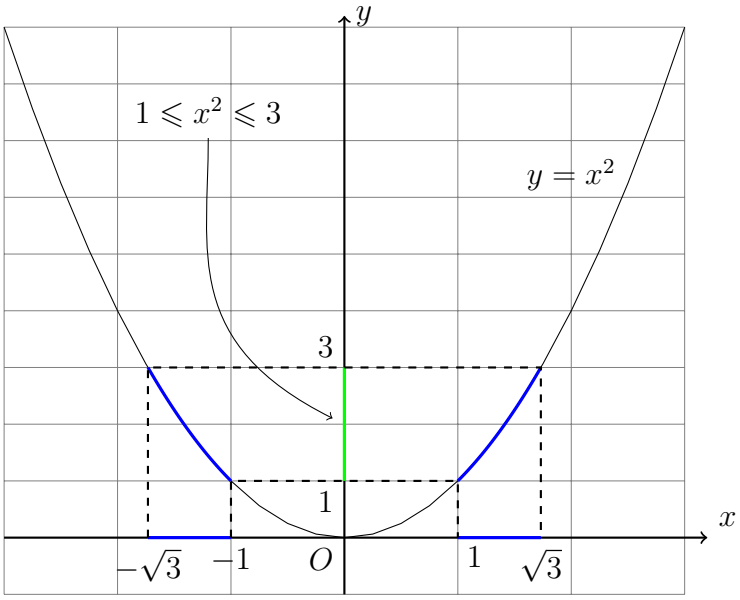




2.7 Résolution graphique

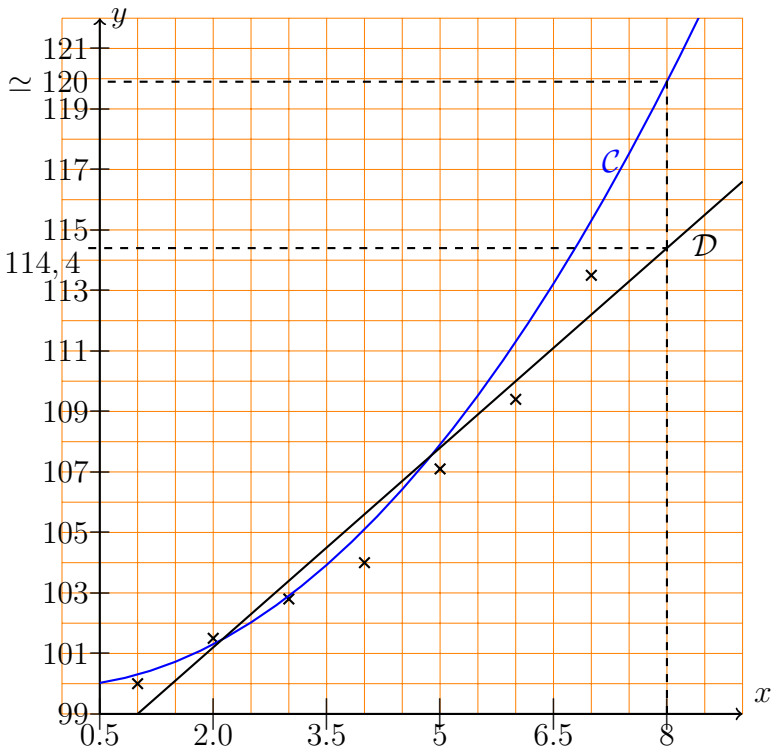


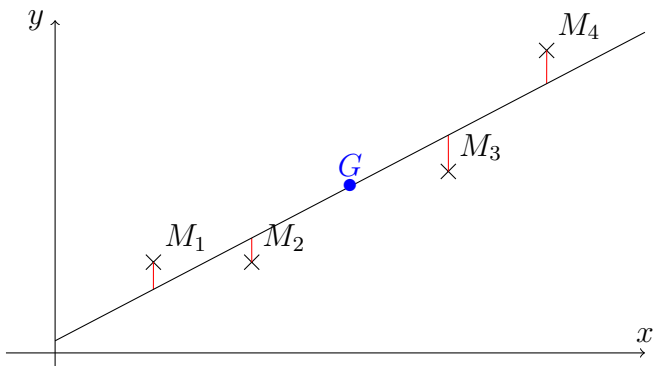
2 a pour image 4 par f : $f(2) = 4$.
1 a pour antécédents -1 et -1 par f : $f(-1) = f(1) = 1$.



$\mathcal{S} = [-\sqrt{3}; -1] \cup [1; \sqrt{3}]$

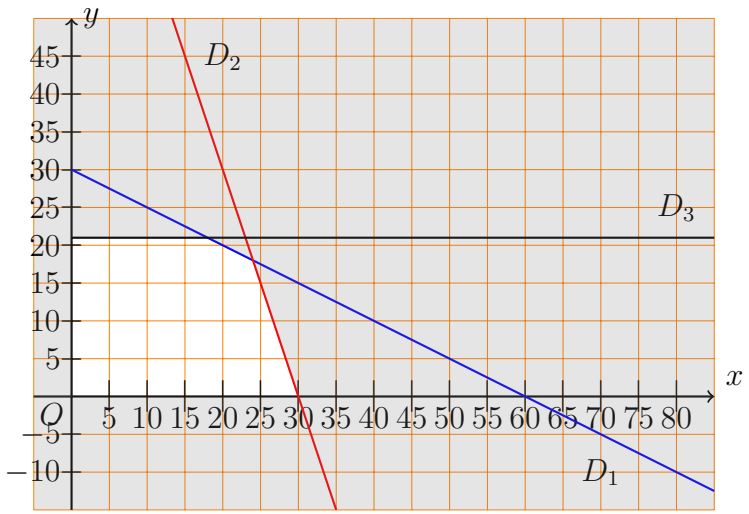
2.8 Nuage de points, ajustement





La droite passe par G et réduit la somme des carrés des longueurs rouges

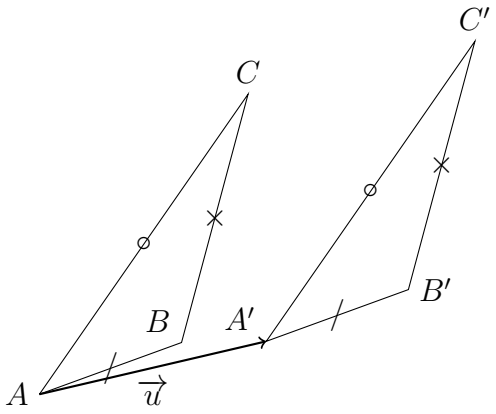
2.9 Programmation linéaire ; Régionnement de plan



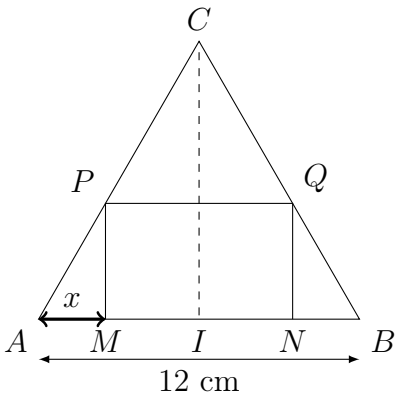
3 Figures de géométrie

3.1 Dans le plan

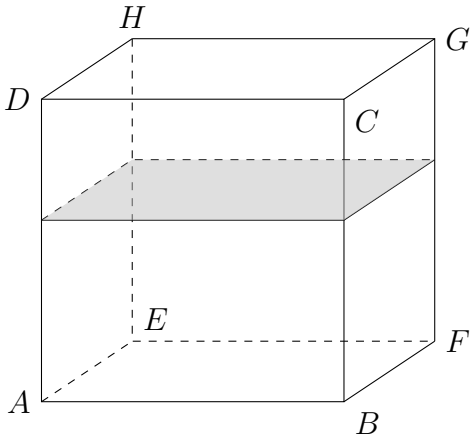
3.1.1 Triangle et translation



3.1.2 Avec un peu de trigonométrie

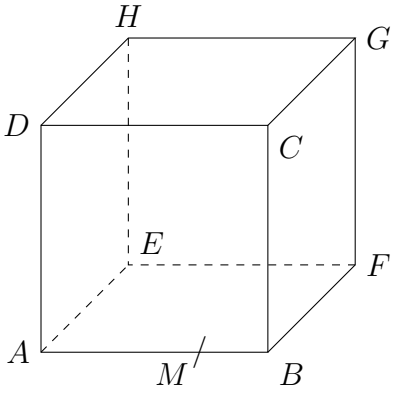


3.1.3 Cube et section parallèle à une face (fausse 3D)

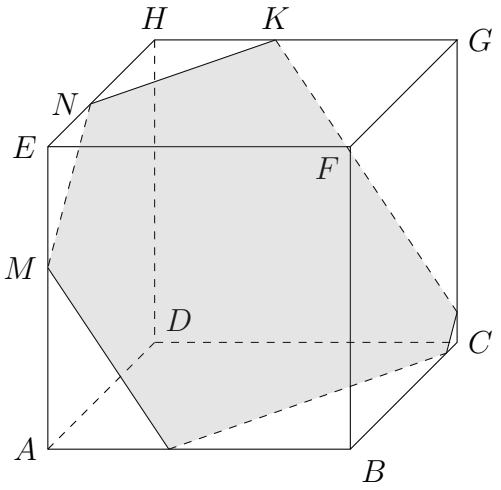


3.2 Dans l'espace

3.2.1 Cube simple

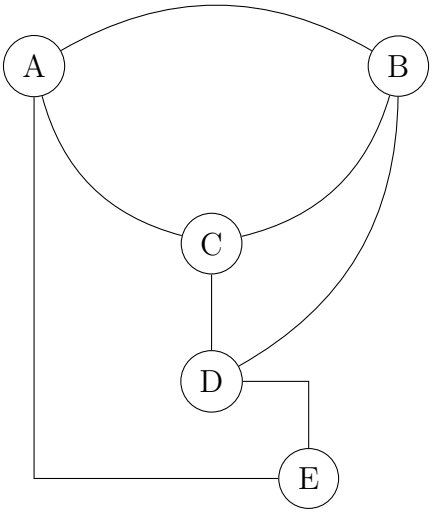


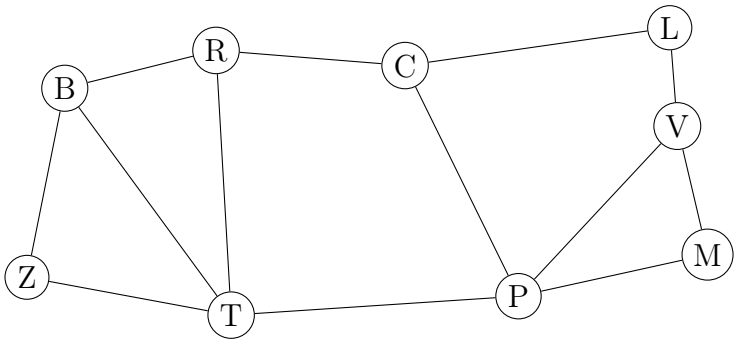
3.2.2 Cube avec section



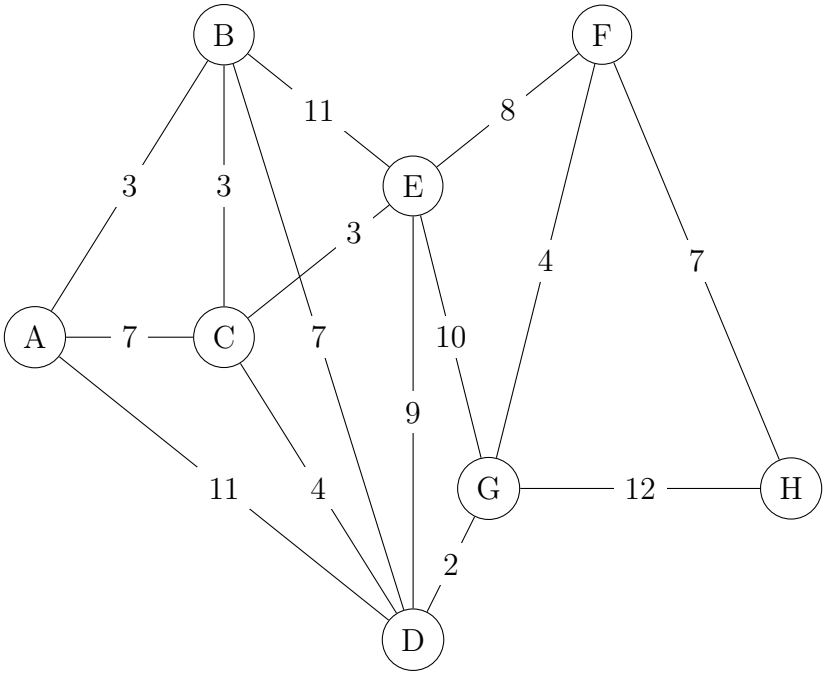
4 Graphes

4.1 Graphe simple

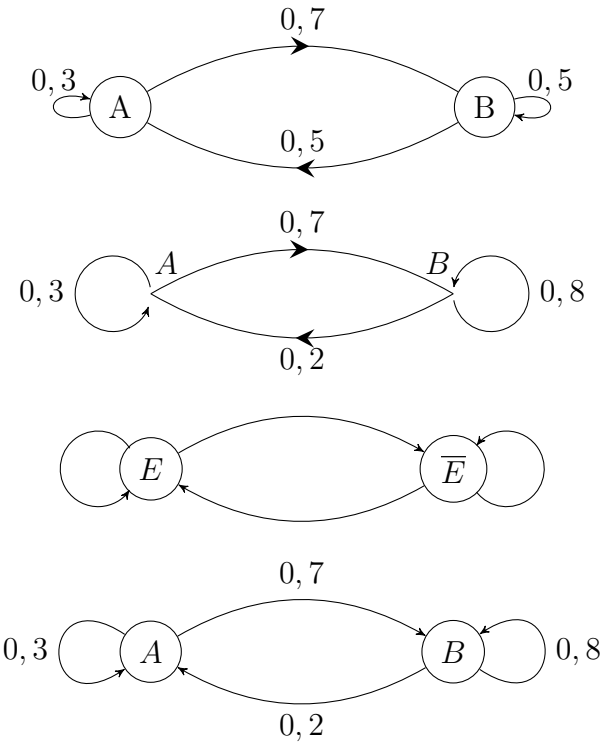




4.2 Graphe étiqueté



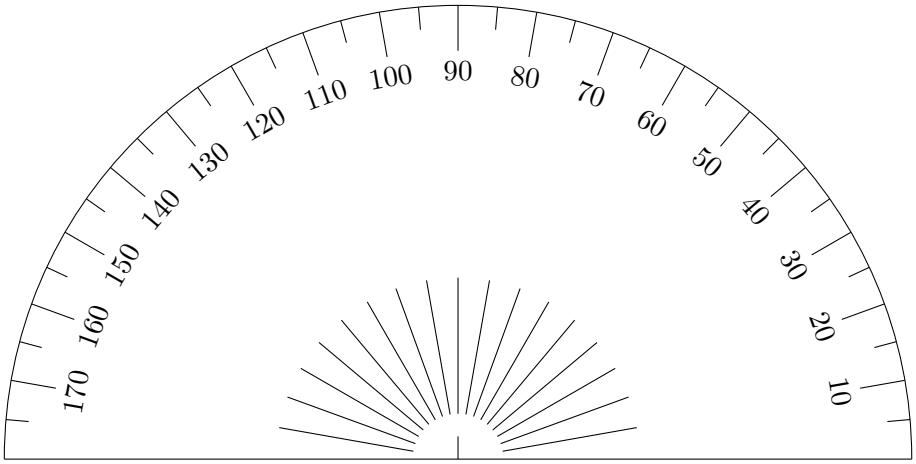
4.3 Graphes orientés ; graphes probabilistes



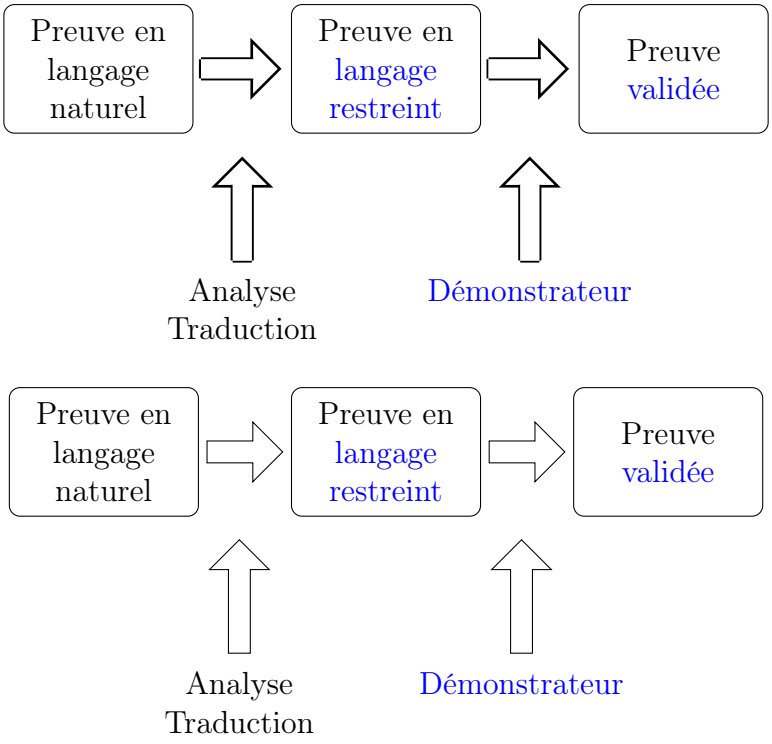
5 Autres

5.1 Panneau Attention

5.2 Rapporteur



5.3 Schéma avec grosses flèches



Le code ci-dessous permet d'obtenir les figures ci-dessus.
Une fois copié depuis le fichier pdf, remplacer les stealth' par stealth'.

```
\documentclass[a4paper,12pt]{article}
\usepackage[francais]{babel}
\usepackage[utf8]{inputenc}
\usepackage[T1]{fontenc}
\usepackage{amsmath,amssymb,mathrsfs,textcomp}
\usepackage{tikz,tkz-tab}
\usepackage{minted} % Nécessite l'installation de pygments
                    % Compiler avec pdflatex --enable-write18

\usetikzlibrary{positioning}
\usetikzlibrary{decorations.markings}
\usetikzlibrary{shapes.arrows}
%\usetikzlibrary{patterns}

%%%%% Choix des marges

\setlength{\textwidth}{180mm}
\setlength{\textheight}{260mm}
\setlength{\oddsidemargin}{-10mm}
\setlength{\evensidemargin}{-10mm}
\setlength{\topmargin}{-10mm}
\setlength{\headheight}{0mm}
\setlength{\headsep}{0mm}
\setlength{\footskip}{10mm}
\setlength{\parindent}{0mm}

%%%%%%% DOCUMENT %%%%%%%%%%

\begin{document}
\setlength{\parindent}{0pt}
\pagestyle{empty}

\section{Arbres de probabilités}

\subsection{Arbres horizontaux pondérés}

\begin{center}
\begin{tikzpicture}[grow=right, thick, level distance=3cm]
\coordinate
    child[sibling distance=20mm]
      {node[] {$C$}
         child[sibling distance=10mm]
           {node[] {$\overline{S}$}
            edge from parent
            node[below] {$0,96$}
           }
         child[sibling distance=10mm]
           {node[] {$S$}
```

```
            edge from parent
            node[above] {$0,04$}
           }
       edge from parent
       node[below=4pt] {$0,05$}
      }
    child[sibling distance=20mm]
      {node[] {$T$}
         child[sibling distance=10mm]
           {node[] {$\overline{S}$}
            edge from parent
            node[below] {$0,92$}
           }
         child[sibling distance=10mm]
           {node[] {$S$}
            edge from parent
            node[above] {$0,08$}
           }
       edge from parent
       node[above=-4pt] {$0,4$}}
    child[sibling distance=20mm]
      {node[] {$A$}
         child[sibling distance=10mm]
           {node[] {$\overline{S}$}
            edge from parent
            node[below] {$0,8$}
           }
         child[sibling distance=10mm]
           {node[] {$S$}
            edge from parent
            node[above] {$0,2$}
           }
       edge from parent
       node[above=2pt] {$0,55$}}
 ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}[grow=right, level distance=3cm]
\coordinate
    child[sibling distance=40mm]
      {node[rectangle,draw] {C}
       edge from parent
       node[above] {$\frac13$}}
    child[sibling distance=40mm]
      {node[rectangle,draw] {S}
         child[sibling distance=15mm]
           {node[rectangle,draw] {P}
            edge from parent
            node[below] {$\frac12$}
```

```
          }
        child[sibling distance=15mm]
          {node[rectangle,draw] {B}
           edge from parent
           node[near end,above=-2pt] {$\frac14$}
          }
        child[sibling distance=15mm]
          {node[rectangle,draw] {O}
            child {node[rectangle,draw] {S,O}}
           edge from parent
           node[above] {$\frac14$}
          }
       edge from parent
       node[above] {$\frac23$}
      }
 ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}[grow=right, level distance=3cm]
\coordinate
    child[sibling distance=30mm]
      {node[rectangle,draw] {$\overline{A}$}
         child[sibling distance=15mm]
           {node[rectangle,draw] {$\overline{B}$}
              child{node[right]{$\overline{A}\cap\overline{B}\qquad
                     \mathbb{P}(\overline{A}\cap \overline{B})=
                     \mathbb{P}(\overline{A})\times
                     \mathbb{P}_{\overline{A}}(\overline{B})$}
                    edge from parent[dashed]}
            edge from parent
            node[below=2pt] {$\mathbb{P}_{\overline{A}}(\overline{B})$}
           }
         child[sibling distance=15mm]
           {node[rectangle,draw] {$B$}
              child{node[right]{$\overline{A}\cap B\qquad
                    \mathbb{P}(\overline{A}\cap B)=
                    \mathbb{P}(\overline{A})\times
                    \mathbb{P}_{\overline{A}}(B)$}
                   edge from parent[dashed]}
            edge from parent
            node[above=2pt] {$\mathbb{P}_{\overline{A}}(B)$}
           }
       edge from parent
       node[below=4pt] {$\mathbb{P}(\overline{A})$}}
    child[sibling distance=30mm]
      {node[rectangle,draw] {$A$}
         child[sibling distance=15mm]
           {node[rectangle,draw] {$\overline{B}$}
              child{node[right]{$A\cap\overline{B}\qquad
```

```
                    \mathbb{P}(A\cap \overline{B})=
                    \mathbb{P}(A)\times
                    \mathbb{P}_{A}(\overline{B})$}
                  edge from parent[dashed]}
             edge from parent
             node[below=2pt] {$\mathbb{P}_A(\overline{B})$}
            }
          child[sibling distance=15mm]
            {node[rectangle,draw] {$B$}
               child{node[right]{$A\cap B\qquad \mathbb{P}(A\cap B)=
                     \mathbb{P}(A)\times\mathbb{P}_A(B)$}
                  edge from parent[dashed]}
             edge from parent
             node[above=2pt] {$\mathbb{P}_A(B)$}
            }
        edge from parent
        node[above=4pt] {$\mathbb{P}(A)$}
       }
 ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}[grow=right, level distance=2cm]
\coordinate
    child[sibling distance=24mm]
      {node {$\overline{S}$}
         child[sibling distance=12mm]
           {node {$\overline{S}$}
              child[sibling distance=6mm]
                {node {$\overline{S}$}
                  child[level distance=1cm]{node[right]{$X=0$}
                    edge from parent[dashed]}
                edge from parent
                node[below=-1pt] {$1-p$}
                }
              child[sibling distance=6mm]
                {node {$S$}
                  child[level distance=1cm]{node[right]{$X=1$}
                    edge from parent[dashed]}
                edge from parent
                node[above=-1pt] {$p$}
                }
             edge from parent
             node[below=1pt] {$1-p$}
           }
         child[sibling distance=12mm]
           {node {$S$}
              child[sibling distance=6mm]
                {node {$\overline{S}$}
                  child[level distance=1cm]{node[right]{$X=1$}
```

```
                edge from parent[dashed]}
            edge from parent
            node[below=-1pt] {$1-p$}
            }
          child[sibling distance=6mm]
            {node {$S$}
              child[level distance=1cm]{node[right]{$X=2$}
                edge from parent[dashed]}
            edge from parent
            node[above=-1pt] {$p$}
            }
        edge from parent
        node[above=1pt] {$p$}
       }
   edge from parent
   node[below=4pt] {$1-p$}
   }
child[sibling distance=24mm]
  {node {$S$}
     child[sibling distance=12mm]
       {node {$\overline{S}$}
          child[sibling distance=6mm]
            {node {$\overline{S}$}
              child[level distance=1cm]{node[right]{$X=1$}
                edge from parent[dashed]}
            edge from parent
            node[below=-1pt] {$1-p$}
            }
          child[sibling distance=6mm]
            {node {$S$}
              child[level distance=1cm]{node[right]{$X=2$}
                edge from parent[dashed]}
            edge from parent
            node[above=-1pt] {$p$}
            }
        edge from parent
        node[below=1pt] {$1-p$}
       }
     child[sibling distance=12mm]
       {node {$S$}
          child[sibling distance=6mm]
            {node {$\overline{S}$}
              child[level distance=1cm]{node[right]{$X=2$}
                edge from parent[dashed]}
            edge from parent
            node[below=-1pt] {$1-p$}
            }
          child[sibling distance=6mm]
            {node {$S$}
              child[level distance=1cm]{node[right]{$X=3$}
                edge from parent[dashed]}
```

```
                edge from parent
                node[above=-1pt] {$p$}
                }
            edge from parent
            node[above=1pt] {$p$}
           }
        edge from parent
        node[above=4pt] {$p$}
       }
 ;
\end{tikzpicture}
\end{center}

\section{Analyse}

\subsection{Tableaux de variation}

\begin{center}
\begin{tikzpicture} %nécessite tkz-tab
\tkzTabInit[lgt=3]{$x$/0.5, Signe de $f'(x)$/1,%
variations \\ de $f$/2}{$0$, $2$, $+\infty$}%
\tkzTabLine{d,-,z,+,}%
\tkzTabVar{D+/ / ,-/${2,4}\ln(2)$,+/}%
% Bien mettre les nombres décimaux entre accolades
\end{tikzpicture}
\end{center}

\subsection{Tableaux de signes}

\begin{center}
\begin{tikzpicture} %nécessite tkz-tab
\tkzTabInit[lgt=3,espcl=2]{$x$/0.8, $-6$/0.8, $x-3$/0.8, $x-15$/0.8,%
signe de $B'(x)$/0.8}{$0$, $3$, $15$, $21$}
\tkzTabLine{,-,t,-,t,-,}
\tkzTabLine{,-,z,+,t,+,}
\tkzTabLine{,-,t,-,z,+,}
\tkzTabLine{,-,z,+,z,-,}
\end{tikzpicture}
\end{center}

\subsection{Repères}

\begin{center}
\begin{tikzpicture}[scale=0.4]
\draw[very thin, gray] (-10,-10) grid (10,10) ;
\draw[thick,black!80] (-10,-10) grid[step=5] (10,10) ;
\draw[thick,->] (-10.2,0) -- (10.5,0) node[above right]{$x$} ;
\draw[thick,->] (0,-10.2) -- (0,10.5) node[right]{$y$} ;
\draw (0,0) node[below left]{$O$} ;
\end{tikzpicture}
\end{center}
```

```
\begin{center}
\begin{tikzpicture}
\draw[very thin, gray] (-4,-3) grid (6,7) ;
\draw[thick,->] (-4,0) -- (6.2,0) node[above right]{$x$} ;
\draw[thick,->] (0,-3) -- (0,7.2) node[right]{$y$} ;
\draw (0,0) node[below left]{$O$} ;
\foreach \x in {-4,-3,-2,-1,1,2,3,4,5,6}%
\draw[thick] (\x,0) node[below left=1pt]{$\x$} +(0,-0.2) -- +(0,0.2) ;
\foreach \y in {-3,-2,-1,1,2,3,4,5,6,7}%
 \draw[thick] (0,\y) node[left]{$\y$} +(-0.1,0) -- +(0.1,0) ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}[x={(1cm,0cm)}, y={(0.5cm,0.7cm)}]
\foreach \x in {-4,-3,...,6} \draw[very thin, gray] (\x,-3) -- (\x,7) ;
\foreach \y in {-3,-2,...,7} \draw[very thin, gray] (-4,\y) -- (6,\y) ;
\draw[thick,->] (-4,0) -- (6.2,0) node[above right]{$x$} ;
\draw[thick,->] (0,-3) -- (0,7.2) node[right]{$y$} ;
\draw (0,0) node[below]{$O$} ;
\foreach \x in {-4,-3,-2,-1,1,2,3,4,5,6}%
 \draw[thick] (\x,0) node[below left=1pt]{$\x$} +(0,-0.2) -- +(0,0.2) ;
\foreach \y in {-3,-2,-1,1,2,3,4,5,6,7}%
 \draw[thick] (0,\y) node[left]{$\y$} +(-0.1,0) -- +(0.1,0) ;
\end{tikzpicture}
\end{center}

\subsection{Courbe de fonction}

\begin{center}
\begin{tikzpicture}[yscale=0.3]
\draw[very thin, gray] (-7,-3) grid (3,12) ;
\draw[thick,->] (-7,0) -- (3.2,0) node[above right]{$x$} ;
\draw[thick,->] (0,-3) -- (0,12.2) node[right]{$y$} ;
\draw (0,0) node[below left]{$O$} ;
\draw[thick] (1,0) node[below left=-2pt]{$1$} +(0,-0.2) -- +(0,0.2);
\draw (0,1) node[left]{$1$} ;
\clip (-7,-3) rectangle (3,12) ;
\draw [domain=-6.3:3] plot[samples=50](\x,{sin(\x r)+exp(\x)}) ;
\draw (2,7) node[above right=-4pt]{$\mathscr{C}_f$} ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}[yscale=0.138*0.8,xscale=1.6*0.8]
\draw[very thin, orange] (-1,-20) grid[xstep=0.2,ystep=2] (7.2,70) ;
\draw[thick,->] (-1,0) -- (7.4,0) node[above right]{$x$} ;
\draw[thick,->] (0,-20) -- (0,72) node[right]{$y$} ;
\draw (0,0) node[below left]{$O$} ;
\foreach \x in {-1,1,2,3,4,5,6,7}%
```

```
 \draw[thick] (\x,0) node[below=1pt]{$\x$} +(0,-1) -- +(0,1) ;
\foreach \y in {-20,-10,10,20,30,40,50,60}%
 \draw[thick] (0,\y) node[left=1pt]{$\y$} +(-0.07,0) -- +(0.07,0) ;
\draw[domain=0:7,thick,blue] plot[samples=30](\x,{\x^3-11*\x^2+23*\x+52}) ;
\draw (2,64) node{$\mathcal{C}_{g}$} ;
\draw (0,52) node{{\color{blue}$\bullet$}} ;
\draw (7,17) node{{\color{blue}$\bullet$}} ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}[scale=2]
\draw[thin, gray] (-2,-1) grid[step=0.25] (4,4) ;
\draw[thick,->] (-2,0) -- (4.2,0) node[above right]{$x$} ;
\draw[thick,->] (0,-1) -- (0,4.2) node[right]{$y$} ;
\draw (0,0) node[below left]{$O$} ;
\foreach \x in {-2,-1,1,2,3,4}%
 \draw[thick] (\x,0) node[below=2pt]{$\x$} +(0,-0.1) -- +(0,0.1) ;
\foreach \y in {-1,1,2,3,4}%
 \draw[thick] (0,\y) node[left=1pt]{$\y$} +(-0.07,0) -- +(0.07,0) ;
\draw[domain=-2:4,thick] plot[samples=100](\x,{(\x+2)*exp(-\x)}) ;
\draw (3,0.25) node[above]{$\mathscr{C}$} ;
\draw[domain=-2:3,thick] plot(\x,{-\x+2}) ;
\draw (2.5,-0.5) node[above right]{$\mathscr{T}$} ;
\draw (0,2) node[above right]{$B$} node{$\bullet$} ;
\draw[thick,<->] (-1,2.718) node[above]{$A$} node{$\bullet$} +(-0.5,0) -- +(0.5,0);
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tabular}{cc}
\begin{tikzpicture}[xscale=0.09,yscale=20]
\def\xscale{0.1};
\def\yscale{20};
\def\d{0.07};
\def\dx{\d/\xscale};
\def\dy{\d/\yscale};
\draw[thick,->] (0,0) -- (78,0) node[right]{$x$} ;
\draw[thick,->] (0,0) -- (0,0.1) node[left]{$y$} ;
\foreach \x in {0,10,...,70}
  \draw (\x,0) node[below]{$\x$} +(0,-\dy) -- +(0,\dy) ;
\def\s{5}
\foreach \m/\c in {20/blue,40/green,60/red}
  {\draw[\c!50!black] [domain=0:75] plot[samples=100]
  (\x,{(1/(sqrt(2*3.1415)*\s)*exp(-1/2*((\x-\m)/\s)^2)}) ;
  \draw[\c!50!black,dashed] (\m,0) -- ++(0,{1/(sqrt(2*3.1415)*\s)})
  node[above]{$\mu=\m$} ;
  } ;
\end{tikzpicture}
&
\begin{tikzpicture}[xscale=0.09,yscale=12]
```

```
\def\xscale{0.09};
\def\yscale{12};
\def\d{0.07};
\def\dx{\d/\xscale};
\def\dy{\d/\yscale};
\draw[thick,->] (0,0) -- (78,0) node[right]{$x$} ;
\draw[thick,->] (0,0) -- (0,0.15) node[left]{$y$} ;
\foreach \x in {0,10,...,70}
  \draw (\x,0) node[below]{$\x$} +(0,-\dy) -- +(0,\dy) ;
\def\m{40}
\foreach \s/\c in {3/blue,5/green,10/red}
  {\draw[\c!50!black] [domain=0:75] plot[samples=100]
  (\x,{(1/(sqrt(2*3.1415)*\s)*exp(-1/2*((\x-\m)/\s)^2)}) ;
  \draw[\c!50!black] (\m,0) ++({\s},{1/(sqrt(2*3.1415)*\s)})
  node[right]{$\sigma=\s$} ;
  } ;
\draw[dashed] (\m,0) -- ++(0,{1/(sqrt(2*3.1415)*3)}) ;
\end{tikzpicture}
\end{tabular}
\end{center}

\subsection{Intégrale}

\begin{center}
\begin{tikzpicture}[scale=0.75]
\draw[very thin, gray] (-1,-1) grid (10,6) ;
\draw[thick,->] (-1,0) -- (10.5,0) node[above right]{$x$} ;
\draw[thick,->] (0,-1) -- (0,6.5) node[right]{$y$} ;
\draw (0,0) node[below left]{$O$} ;
\draw (1,0) node[below right]{$a$} +(0,0.2) -- +(0,-0.2) ;
\draw (4,0) node[below right]{$c$} +(0,0.2) -- +(0,-0.2) ;
\draw (8,0) node[below right]{$b$} +(0,0.2) -- +(0,-0.2) ;
\draw[very thick] plot[smooth] coordinates
  {(1,4) (2.2,4.7) (4,5) (7,4) (8,3)} ;
\draw (5.2,5.1) node{$\mathcal{C}_f$} ;
\begin{scope}
\clip (1,0) rectangle (4,6) ;
\fill[bottom color=red,top color=red!30!white, opacity=0.5]%
 (1,0) -- plot[smooth] coordinates
  {(1,4) (2.2,4.7) (4,5) (7,4) (8,3)} -- (8,0) -- cycle ;
\end{scope}
\begin{scope}
\clip (4,0) rectangle (8,6) ;
\fill[bottom color=blue,top color=blue!30!white,opacity=0.5]%
 (4,0) -- plot[smooth] coordinates
  {(1,4) (2.2,4.7) (4,5) (7,4) (8,3)} -- (8,0) -- cycle ;
\end{scope}
\end{tikzpicture}
\end{center}

\begin{center}
```

```
\begin{tikzpicture}[scale=0.6]
\draw[very thin, gray] (0,-7) grid (12,3) ;
\draw[thick,->] (0,0) -- (12.2,0) node[above right]{$x$} ;
\draw[thick,->] (0,-7) -- (0,3.2) node[right]{$y$} ;
\draw (0,0) node[below left]{$0$} ;
\draw (1,0) node[below right=1pt]{$1$} ;
\draw (0,1) node[left]{$1$} ;
\clip (0,-7) rectangle (12,3) ;
\draw [domain=0.001:12] plot[samples=100](\x,{ln(\x)}) ;
\draw (10,2.6) node{$y=\ln(x)$} ;
\fill[bottom color=orange,top color=red, opacity=0.5]%
 (1,0) -- plot[domain=1:4] (\x,{ln(\x)}) -- (4,0) --cycle ;
\fill[color=blue,opacity=0.5]%
 (5,0) -- (5,2.4849) -- plot[domain=5:8] (\x,{ln(\x)}) -- (8,0) -- cycle ;
\draw (5,0) node[below]{$5$} ;
\draw (8,0) node[below right]{$8$} ;
\draw[fill=blue,opacity=0.5] (7.1,-2.5) rectangle(7.5,-2.1) ;
\draw (7.4,-2.3) node[right]{$\int_5^8\ln(t)\text{d}t$} ;
\draw[<->,color=red,>=stealth'] (1,0) +(-1,-1*1) -- +(1,1*1) ;
\end{tikzpicture}
\end{center}

\subsection{Courbe passant par des points}

\begin{center}
\begin{tikzpicture}
\draw[very thin, gray] (0,-2) grid (16,8) ;
\draw[thick,->] (0,0) -- (16.2,0) node[above right]{$x$} ;
\draw[thick,->] (0,-2) -- (0,8.2) node[right]{$y$} ;
\draw (0,0) node[below left]{$0$} ;
\foreach \x in {1,2,3,4,5,6,7,10,15}%
 \draw[thick] (\x,0) node[below right=-2pt]{$\x$}  +(0,-0.2) -- +(0,0.2) ;
\foreach \y in {-2,-1,1,4,5,6,7} \draw[thick]%
 (0,\y) node[left]{$\y$} +(-0.1,0) -- +(0.1,0) ;
\foreach \x/\y in {1/-2,2/0,3/1,4/5,5/7,6/6,7/3,10/-1,15/4}%
 \draw (\x,\y) node{{\large $\mathbf{\times}$}} ;
\draw[very thick] plot[smooth] coordinates%
 {(1,-2) (2,0) (3,1) (4,5) (5,7) (6,6) (7,3) (10,-1) (15,4)} ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}
\draw[very thin, gray] (0,-2) grid (16,8) ;
\draw[thick,->] (0,0) -- (16.2,0) node[above right]{$x$} ;
\draw[thick,->] (0,-2) -- (0,8.2) node[right]{$y$} ;
\draw (0,0) node[below left]{$0$} ;
\foreach \x in {1,2,3,4,5,6,7,10,15}%
 \draw[thick] (\x,0) node[below right=-2pt]{$\x$}  +(0,-0.2) -- +(0,0.2) ;
\foreach \y in {-2,-1,1,4,5,6,7}%
 \draw[thick] (0,\y) node[left]{$\y$} +(-0.1,0) -- +(0.1,0) ;
```

```
\foreach \x/\y in {1/-2,2/0,3/1,4/5,5/7,6/6,7/3,10/-1,15/4}%
 \draw (\x,\y) node{{\large $\mathbf{\times}$}} ;
\draw[very thick] (1,-2) to[out=85,in=40-180] (2,0)%
 to[out=40,in=50-180] (3,1) to[out=50,in=80-180] (4,5)%
 to[out=80,in=0-180] (5,7) to[out=0,in=-80+180] (6,6)%
 to[out=-80,in=-60+180] (7,3) to[out=-60,in=0+180] (10,-1)%
 to[out=0,in=80-180] (15,4) ;
\end{tikzpicture}
\end{center}

\subsection{Résolution graphique}

\begin{center} % Nécessite decorations.markings
\begin{tikzpicture}[yscale=0.75,xscale=1.5,decoration={
markings,% switch on markings
mark=between positions 0.1 and 1 step 7mm with {\arrow{latex}}}]
\draw[very thin, gray] (-3,-1) grid (3,9) ;
\draw[thick,->] (-3,0) -- (3.2,0) node[above right]{$x$} ;
\draw[thick,->] (0,-1) -- (0,9.2) node[right]{$y$} ;
\draw (0,0) node[below left]{$O$} ;
\foreach \x in {-1,1,2} %
  \draw (\x,0) node[below]{$\x$} ;
\draw (0,1) node[below left]{$1$} ;
\draw [domain=-3:3] plot(\x,{\x*\x}) ;
\draw[-latex,dashed,thick,red,postaction={decorate}]
 (2,0) |- (0,4) node[left]{$f(2)=4$} ;
\draw[-latex,dashed,thick,blue,postaction={decorate}]
 (0,1) -| (1,0) ;
\draw[-latex,dashed,thick,blue,postaction={decorate}]
 (0,1) -| (-1,0) ;
\draw (2.5,7.2) node{$\mathcal{C}_f$} ;
\draw (0,-1.5) node{$2$ a pour image $4$ par $f$ : $f(2)=4$.} ;
\draw (0,-2.2) node{$1$ a pour antécédents $-1$ et $-1$ par $f$ : $f(-1)=f(1)=1$.} ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}[yscale=0.75,xscale=1.5]
\draw[very thin, gray] (-3,-1) grid (3,9) ;
\draw[thick,->] (-3,0) -- (3.2,0) node[above right]{$x$} ;
\draw[thick,->] (0,-1) -- (0,9.2) node[right]{$y$} ;
\draw (0,0) node[below left]{$O$} ;
\draw (1,0) node[below right=-1pt]{$1$} ;
\draw (0,1) node[below left]{$1$} ;
\draw (-1,0) node[below]{$-1$} ;
\draw (-1.732,0) node[below]{$-\sqrt{3}$} ;
\draw (1.732,0) node[below]{$\sqrt{3}$} ;
\draw (0,3) node[above left]{$3$} ;
\draw [domain=-3:3] plot(\x,{\x*\x}) ;
\draw[color=green,very thick] (0,1) -- (0,3) ;
\draw[domain=-sqrt(3):-1,color=blue,very thick] plot(\x,{\x*\x}) ;
```

```
\draw[domain=1:sqrt(3),color=blue,very thick] plot(\x,{\x*\x}) ;
\draw[color=blue,very thick] (-1.732,0) -- (-1,0) (1,0) -- (1.732,0) ;
\draw[dashed,thick] (-1.732,0) |-(0,3) -| (1.732,0) ;
\draw[dashed,thick] (-1,0) |- (0,1) -| (1,0) ;
\draw (2,6.4) node{$y=x^2$} ;
\node (I) at (-1.2,7.5) {$1\leqslant x^2\leqslant 3$} ;
\draw[->,shorten >=5pt] (I) to[out=-90] (0,2) ;
\draw (0,-1.5) node{$\mathcal{S}=[-\sqrt{3};-1]\cup[1;\sqrt{3}]$} ;
\end{tikzpicture}
\end{center}

\subsection{Nuage de points, ajustement}

\begin{center}
\begin{tikzpicture}[yscale=0.4]
\def\xscale{1};
\def\yscale{0.4};
\def\d{0.07};
\def\dx{\d/\xscale};
\def\dy{\d/\yscale};
\draw[very thin, orange] (0,99) grid[xstep=0.5,ystep=1] (9,122) ;
\draw[thick,->] (0.5,99) -- (9,99) node[above right]{$x$} ;
\draw[thick,->] (0.5,99) -- (0.5,122) node[right]{$y$} ;
\foreach \x in {0.5,2.0,...,8.0} \draw (\x,99) node[below]{$\x$} node{$|$} ;
\foreach \y in {99,101,...,121} \draw (0.5,\y) node[left]{$\y$} node{$-$};
\foreach \x/\y in {1/100,2/101.5,3/102.8,4/104,5/107.1,6/109.4,7/113.5}%
 \draw[thick] (\x,\y) +(-\dx,-\dy) -- +(\dx,\dy) +(-\dx,\dy) -- +(\dx,-\dy) ;
\begin{scope}
\clip (0.5,99) rectangle (9,122) ;
\draw[color=blue,thick,domain=0.5:8.5] plot(\x,{0.3*\x*\x+0.1*\x+99.9}) ;
\draw[color=blue] (7,118) node[below right]{$\mathcal{C}$} ;
\draw[thick,domain=0.5:9] plot(\x,{2.2*\x+96.8}) ;
\draw (8.5,114.5) node{$\mathcal{D}$} ;
\end{scope}
\draw[dashed, thick] (8,99) |- (0.3,2.2*8+96.8)%
 node[below left=-4pt]{$114,4$} ;
\draw[dashed, thick] (8,114.4) |- (0.5,119.9)%
 node[left]{$\simeq 120$} ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}[yscale=0.4,xscale=1.3]
\def\xscale{1.3};
\def\yscale{0.4};
\def\d{0.1};
\def\dx{\d/\xscale};
\def\dy{\d/\yscale};
\def\a{1.7} ;
\def\b{0.4} ;
\draw[->] (-0.5,0) -- (6,0) node[above]{$x$} ;
```

```
\draw[->] (0,-0.5) -- (0,11) node[left]{$y$} ;
\foreach \i/\x/\y in {1/1/3,2/2/3,3/4/6,4/5/10}
 {\draw (\x,\y) node (M\i) {} node[above right]{$M_\i$}
  +(-\dx,-\dy) -- +(\dx,\dy) +(-\dx,\dy) -- +(\dx,-\dy) ;
 \draw[red] (M\i.center) -- (\x,\a*\x+\b) ;
 };
\draw (0,\b) -- ++(6,6*\a) ;
\draw[blue] (3,5.5) node{\textbullet} node[above]{$G$} ;
\draw (3,-1) node{La droite passe par $G$
 et réduit la somme des carrés des longueurs rouges} ;
\end{tikzpicture}
\end{center}

\subsection{Programmation linéaire ; Régionnement de plan}

\begin{center}
\begin{tikzpicture}[scale=(1/5)/2]
\draw[very thin, orange] (-5,-15) grid[step=5](85,50) ;
\draw[thick,->] (-5,0) -- (85,0) node[above right]{$x$} ;
\draw[thick,->] (0,-15) -- (0,50) node[right]{$y$} ;
\draw (0,0) node[below left=-2pt]{$O$} ;
\foreach \x in {5,10,...,80} \draw (\x,0) node[below]{$\x$} node{$|$} ;
\foreach \y in {5,10,...,45} \draw (0,\y) node[left]{$\y$} node{$-$};
\foreach \y in {-5,-10} \draw (0,\y) node[left]{$\y$} node{$-$};
\clip (-5,-15) rectangle (85,50) ;
\draw[domain=0:85,color=blue,thick] plot(\x,{-1/2*\x+30}) ;
\draw (70,-10) node{$D_1$} ;
\draw[domain=10:35,color=red,thick] plot(\x,{-3*\x+90}) ;
\draw (20,45) node{$D_2$} ;
\draw[domain=0:85,color=black,thick] plot(\x,{21}) ;
\draw (80,25) node{$D_3$} ;
\fill[color=gray,opacity=0.2]%
 (-5,-15) -- (85,-15) -- (85,0) -- (-5,0) -- cycle ;
\fill[color=gray,opacity=0.2]%
 (-5,0) -- (-5,50) -- (0,50) -- (0,0) --cycle ;
\fill[color=gray,opacity=0.2]%
 (0,21) -- plot[domain=0:18] (\x,{21})%
 -- plot[domain=18:24] (\x,{-1/2*\x+30})%
 -- plot[domain=24:30] (\x,{-3*\x+90})%
 -- (85,0) -- (85,50) -- (0,50) -- cycle ;
\end{tikzpicture}
\end{center}

\section{Figures de géométrie}

\subsection{Dans le plan}

\subsubsection{Triangle et translation}

\begin{center}
\begin{tikzpicture}
```

```
\begin{scope}
\draw (0,0) node[left]{$A$}%
 -- ++(20:2) node[midway]{$/$} node[above left]{$B$}%
 -- ++(75:3.4) node[midway]{$\times$} node[above]{$C$}%
 -- (0,0)  node[midway]{$\circ$} ;
\draw [thick,->] (0,0) -- (3,0.7)%
 node[midway,below]{$\overrightarrow{u}$};
\end{scope}
\begin{scope}[xshift=3cm,yshift=0.7cm]
\draw (0,0) node[above left]{$A'$} -- ++(20:2)%
 node[midway]{$/$} node[right]{$B'$}%
 -- ++(75:3.4) node[midway]{$\times$} node[above]{$C'$} -- (0,0)%
  node[midway]{$\circ$} ;
\end{scope}
\end{tikzpicture}
\end{center}

\subsubsection{Avec un peu de trigonométrie}

\begin{center}
\begin{tikzpicture}[scale=0.25*29.7/21]
\draw (0,0) node[below left]{$A$} -- ++(0:12) node[below right]{$B$}
 -- ++(180-60:12) node (C){} node[above]{$C$} -- cycle ;
\draw[<->,>=latex] (0,-1.5) -- ++(12,0) node[midway,below]{$12$ cm} ;
\draw[dashed] (C) -- (6,0) node[below]{$I$} ;
\def\x{2.5} ;
\draw[very thick,<->] (0,0) -- ++(\x,0) node[midway,above]{$x$} ;
\draw (\x,0)  node[below]{$M$} -- (\x,{\x*tan(60)}) node[above left]{$P$}
 -- ++({2*(6-\x)},0) node[above right]{$Q$}
 -- ++(0,{-\x*tan(60)}) node[below]{$N$} ;
\end{tikzpicture}
\end{center}

\subsubsection{Cube et section parallèle à une face (fausse 3D)}

\begin{center}
\begin{tikzpicture}[scale=4]
\draw (0,0) rectangle(1,1) ;
%\draw (0,0) -- (1,0) -- (1,1) -- (0,1) -- cycle ;
\draw (0,0) ++(0.3,1+0.2) -- ++(1,0) -- ++(0,-1) ;
\draw (0,1) -- ++(0.3,0.2) ;
\draw (1,0) -- ++(0.3,0.2) ;
\draw (1,1) -- ++(0.3,0.2) ;
\draw [dashed] (0,0) ++(0.3,1+0.2) -- ++(0,-1) -- ++(1,0) ;
\draw [dashed] (0,0) -- ++(0.3,0.2) ;
\draw (0,0) node[left]{$A$} ;
\draw (1,0) node[below right]{$B$} ;
\draw (1,1) node[below right]{$C$} ;
\draw (0,1) node[left]{$D$} ;
\draw (0+0.3,0+0.2) node[above right]{$E$} ;
\draw (1+0.3,0+0.2) node[right]{$F$} ;
```

```
\draw (1+0.3,1+0.2) node[right]{$G$} ;
\draw (0+0.3,1+0.2) node[above]{$H$} ;
\draw [dashed] (0,0.6) -- ++(0.3,0.2) -- ++(1,0) ;
\draw (1+0.3,0.6+0.2) -- ++(-0.3,-0.2) -- ++(-1,0) ;
\fill [color=gray!50,opacity=0.5]%
 (0,0.6) -- ++(0.3,0.2) -- ++(1,0) -- ++(-0.3,-0.2) -- cycle ;
\end{tikzpicture}
\end{center}

\subsection{Dans l'espace}

\subsubsection{Cube simple}

\begin{center}
\begin{tikzpicture}[scale=3]
\draw (0,0,1) -- (1,0,1) -- (1,1,1) -- (0,1,1) -- cycle ;
\draw (0,1,1) -- (0,1,0) -- (1,1,0) -- (1,1,1) ;
\draw (1,1,0) -- (1,0,0) -- (1,0,1) ;
\draw [dashed] (0,0,1) -- (0,0,0) ;
\draw [dashed] (0,1,0) -- (0,0,0) -- (1,0,0) ;
\draw (0,0,1) node[left]{$A$} ;
\draw (1,0,1) node[below right]{$B$} ;
\draw (1,1,1) node[below right]{$C$} ;
\draw (0,1,1) node[left]{$D$} ;
\draw (0,0,0) node[above right]{$E$} ;
\draw (1,0,0) node[right]{$F$} ;
\draw (1,1,0) node[right]{$G$} ;
\draw (0,1,0) node[above]{$H$} ;
\draw (0.7,0,1) node{$/$} ;
\draw (0.7,0,1) node[below left]{$M$} ;
\end{tikzpicture}
\end{center}

\subsubsection{Cube avec section}

\begin{center}
\begin{tikzpicture}%
 [scale=4, x={(1cm,0cm)}, y={(0.353cm,0.353cm)}, z={(0cm,1cm)}]
\draw (0,0,0) -- (1,0,0) -- (1,0,1) -- (0,0,1) -- cycle ;
\draw (0,0,1) -- (0,1,1) -- (1,1,1) -- (1,0,1) ;
\draw (1,1,1) -- (1,1,0) -- (1,0,0) ;
\draw [dashed] (0,0,0) -- (0,1,0) ;
\draw [dashed] (0,1,1) -- (0,1,0) -- (1,1,0) ;
\draw (0,0,0) node[left]{$A$} ;
\draw (1,0,0) node[below right]{$B$} ;
\draw (1,0,1) node[below left]{$F$} ;
\draw (0,0,1) node[left]{$E$} ;
\draw (0,1,0) node[above right]{$D$} ;
\draw (1,1,0) node[right]{$C$} ;
\draw (1,1,1) node[right]{$G$} ;
\draw (0,1,1) node[above]{$H$} ;
```

```
\draw (0,0,0.6) node[left]{$M$} ;
\draw (0,0.4,1) node[left]{$N$} ;
\draw (0.4,1,1) node[above]{$K$} ;
\draw (0.4,1,1) -- (0,0.4,1) ;
\draw [dashed] (0,0.4,1) -- (0,0,0.6) ;
\draw (0,0,0.6) -- (0.4,0,0) ;
\draw [dashed] (0.4,0,0) -- (1,0.9,0) ;
\draw (1,0.9,0) -- (1,1,0.1) ;
\draw [dashed] (1,1,0.1) -- (0.4,1,1) ;
\fill [color=gray,opacity=0.2] (0.4,1,1) -- (0,0.4,1) -- (0,0,0.6)%
 -- (0.4,0,0) -- (1,0.9,0) -- (1,1,0.1)-- cycle ;
\end{tikzpicture}
\end{center}

\section{Graphes}

\subsection{Graphe simple}

\begin{center}
\begin{tikzpicture} % Nécessite positioning
\node[draw,circle] (A) {A} ;
\node[draw,circle] (B) [right=4cm of A] {B} ;
\node[draw,circle] (C) [below right=2.5cm of A] {C} ;
\node[draw,circle] (D) [below=1cm of C] {D} ;
\node[draw,circle] (E) [below right=1cm of D] {E} ;
\draw (A) to[bend left] (B) ;
\draw (A) to[bend right] (C) ;
\draw (A) |- (E) ;
\draw (B) to[bend left] (C) ;
\draw (B) to[bend left] (D) ;
\draw (C) -- (D) ;
\draw (D) -| (E) ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}[every node/.style={circle,draw,inner sep=2pt}]
\node (Z) at (0.5,0.5) {Z} ;
\node (B) at (1,3) {B} ;
\node (T) at (3.2,0) {T} ;
\node (R) at (3,3.5) {R} ;
\node (C) at (5.5,3.3) {C} ;
\node (P) at (7,0.25) {P} ;
\node (L) at (9,3.8) {L} ;
\node (V) at (9.1,2.5) {V} ;
\node (M) at (9.5,0.8) {M} ;
\draw (Z) -- (B) -- (R) -- (C) -- (L) -- (V)
  -- (M) -- (P) -- (T) -- (Z) ;
\draw (B) -- (T) -- (R) ;
\draw (C) -- (P) -- (V) ;
```

```
\end{tikzpicture}
\end{center}

\subsection{Graphe étiqueté}

\begin{center}
\begin{tikzpicture}[xscale=2.5,yscale=2]
\node[draw,circle] (A) at (0,2) {A} ;
\node[draw,circle] (B) at (1,4) {B} ;
\node[draw,circle] (C) at (1,2) {C} ;
\node[draw,circle] (D) at (2,0) {D} ;
\node[draw,circle] (E) at (2,3) {E} ;
\node[draw,circle] (F) at (3,4) {F} ;
\node[draw,circle] (G) at (2.4,1) {G} ;
\node[draw,circle] (H) at (4,1) {H} ;
\draw (A) -- (B) node[midway,fill=white]{$3$} ;
\draw (A) -- (C) node[midway,fill=white]{$7$} ;
\draw (A) -- (D) node[midway,fill=white]{$11$} ;
\draw (B) -- (C) node[midway,fill=white]{$3$} ;
\draw (B) -- (D) node[midway,fill=white]{$7$} ;
\draw (B) -- (E) node[midway,fill=white]{$11$} ;
\draw (C) -- (D) node[midway,fill=white]{$4$} ;
\draw (C) -- (E) node[near end,fill=white]{$3$} ;
\draw (D) -- (E) node[midway,fill=white]{$9$} ;
\draw (D) -- (G) node[midway,fill=white]{$2$} ;
\draw (E) -- (F) node[midway,fill=white]{$8$} ;
\draw (E) -- (G) node[midway,fill=white]{$10$} ;
\draw (F) -- (G) node[midway,fill=white]{$4$} ;
\draw (F) -- (H) node[midway,fill=white]{$7$} ;
\draw (G) -- (H) node[midway,fill=white]{$12$} ;
\end{tikzpicture}
\end{center}

\subsection{Graphes orientés ; graphes probabilistes}

\begin{center}
\begin{tikzpicture} % Nécessite decorations.markings et positioning
 [decoration={markings,mark=at position 0.52 with%
 {\arrow[line width=2pt]{stealth}}}]
\node[draw,circle] (A) {A} ;
\node[draw,circle] (B) [right=4cm of A] {B} ;
\draw[->,>=stealth'] (A) to[loop left] node[midway,above]{$0,3$} (A) ;
\draw[postaction=decorate] (A) to[bend left] node[midway,above]{$0,7$} (B) ;
\draw[postaction=decorate] (B) to[bend left] node[midway,above]{$0,5$} (A);
\draw[->,>=stealth'] (B) to[loop right] node[midway,above]{$0,5$} (B);
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture} % Nécessite decorations.markings
 [decoration={markings,mark=at position 0.52 with%
```

```
 {\arrow[line width=2pt]{stealth}}}]
\draw[->,>=stealth'] (0-0.5,0) ++(10:0.5) arc (10:340:0.5) ;
\draw (-1,0) node[left]{$0,3$} ;
\draw[postaction=decorate] (0,0) to[bend left] node[above]{$0,7$}%
 node[pos=0.05,above]{$A$} node[pos=0.95,above]{$B$} (4,0) ;
\draw[->,>=stealth'] (4+0.5,0) ++(-170:0.5) arc (-170:170:0.5) ;
\draw (5,0) node[right]{$0,8$} ;
\draw[postaction=decorate] (4,0) to[bend left] node[below]{$0,2$} (0,0) ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}
\node[draw,circle] (A) at (-2,0) {$E$} ;
\node[draw,circle] (B) at (2,0) {$\overline{E}$} ;
\draw[->,>=stealth'] (-2-0.7,0) ++(33:0.5) arc (33:326:0.5) ;
\draw[->,>=stealth'] (A) to[bend left] (B) ;
\draw[->,>=stealth'] (B) to[bend left] (A) ;
\draw[->,>=stealth'] (2+0.7,0) ++(-142:0.5) arc (-142:142:0.5) ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}
\node[draw,circle] (A) at (-2,0) {$A$} ;
\node[draw,circle] (B) at (2,0) {$B$} ;
\draw[->,>=stealth'] (A) .. controls +(-1.5,1) and +(-1.5,-1) ..
 node[midway,left]{$0,3$} (A) ;
\draw[->,>=stealth'] (A) to[bend left] node[midway,above]{$0,7$} (B)  ;
\draw[->,>=stealth'] (B) to[bend left] node[midway,below]{$0,2$} (A) ;
\draw[->,>=stealth'] (B) .. controls +(1.5,-1) and +(1.5,1) ..
 node[midway,right]{$0,8$} (B) ;
\end{tikzpicture}
\end{center}

\section{Autres}

\subsection{Panneau Attention}

\begin{center}
\begin{tikzpicture}[scale=0.6]
\draw[fill=red,rounded corners=1.5pt]
 (0,0) -- (1,0) -- (0.5,1) -- cycle ;
\draw[fill=white,rounded corners=2pt]
 (0.13,0.08) -- (0.87,0.08) -- (0.5,0.8) -- cycle ;
\draw[fill=black,rounded corners=1pt]
 (0.5,0.3) -- (0.55,0.6) -- (0.45,0.6) -- cycle ;
\fill (0.5,0.2) circle(0.04) ;
\end{tikzpicture}
\end{center}
```

```
\begin{center}
\begin{tikzpicture}[scale=4]
\draw[fill=red,rounded corners=10pt]
 (0,0) -- (1,0) -- (0.5,1) -- cycle ;
\draw[fill=white,rounded corners=12pt]
 (0.13,0.08) -- (0.87,0.08) -- (0.5,0.8) -- cycle ;
\draw[fill=black,rounded corners=6pt]
 (0.5,0.3) -- (0.55,0.6) -- (0.45,0.6) -- cycle ;
\fill (0.5,0.2) circle(0.04) ;
\end{tikzpicture}
\end{center}


\subsection{Rapporteur}

\begin{center}
\begin{tikzpicture}[scale=1.2]
\draw (-5,0) -- +(2*5,0) ;
\draw (0,0) -- (0,0.25) ;
\draw (5,0) arc (0:180:5) ;
\foreach \a in {10,20,...,170}%
 \draw (0,0) ++(\a:0.5) -- ++(\a:1.5) ++(\a:2.5)%
 node[rotate=\a-90,below]{{\small $\a$}} -- ++(\a:0.5);
\foreach \a in {5,15,...,175} \draw (0,0) ++(\a:4.75) -- ++(\a:0.25);
\end{tikzpicture}
\end{center}

\subsection{Schéma avec grosses flèches}

\begin{center}
\begin{tikzpicture}[scale=0.9] % Nécessite decorations.markings et positioning
\tikzstyle{vecArrow} = [thick, decoration={markings,mark=at position%
   -0.1cm with {\arrow[scale=2.5]{open triangle 90}},%
   mark=at position 0.1cm with {\arrow[thick]{|}}},%
   double distance=0.25cm, shorten >= 0.5cm, shorten <=0.1cm,%
   preaction = {decorate},%
   postaction = {draw,line width=0.25cm, white, shorten <=0.1cm,shorten >= 0.4cm}]
\node[draw,rounded corners,align=center,minimum width=2.5cm,minimum height=1.7cm]
 (Pln) {Preuve en \\ langage \\ naturel} ;
\node[right=0.5cm of Pln] (k1) {} ;
\node[draw,rounded corners,align=center,minimum width=2.5cm,minimum height=1.7cm]
 (Plr) [right=0.5cm of k1]%
  {Preuve en \\ {\color{blue}langage} \\ {\color{blue} restreint}} ;
\node[right=0.5cm of Plr] (k2) {} ;
\node[draw,rounded corners,align=center,minimum width=2.5cm,minimum height=1.7cm]
 (Pv) [right=0.5cm of k2] {Preuve \\ {\color{blue}validée}} ;
\node[below=0.6cm of k1] (k1s) {} ;
\node[below=0.6cm of k2] (k2s) {} ;
\node[below=1.6cm of k1s,align=center] (A) {Analyse \\ Traduction} ;
\node[below=1.6cm of k2s,align=center] (D) {{\color{blue}Démonstrateur}} ;
\draw[vecArrow] (Pln) to (Plr) ;
```

```
\draw[vecArrow] (Plr) to (Pv) ;
\draw[vecArrow] (A) to (k1s) ;
\draw[vecArrow] (D) to (k2s) ;
\end{tikzpicture}
\end{center}

\begin{center}
\begin{tikzpicture}[scale=0.9] % Nécessite positioning et shapes.arrows
\node[draw,rounded corners,align=center,minimum width=2.5cm,minimum height=1.7cm]
 (Pln) {Preuve en \\ langage \\ naturel} ;
\node[right=0.1cm of Pln,draw, single arrow, minimum height=1cm] (k1) {} ;
\node[draw,rounded corners,align=center,minimum width=2.5cm,minimum height=1.7cm]
 (Plr) [right=0.1cm of k1]%
  {Preuve en \\ {\color{blue}langage} \\ {\color{blue} restreint}} ;
\node[right=0.1cm of Plr,draw, single arrow, minimum height=1cm] (k2) {} ;
\node[draw,rounded corners,align=center,minimum width=2.5cm,minimum height=1.7cm]
 (Pv) [right=0.1cm of k2] {Preuve \\ {\color{blue}validée}} ;
\node[below=1cm of k1,draw, single arrow, shape border rotate=90,
minimum height=1.5cm] (k1s) {} ;
\node[below=1cm of k2,draw, single arrow, shape border rotate=90,
minimum height=1.5cm] (k2s) {} ;
\node[below=0.1cm of k1s,align=center] (A) {Analyse \\ Traduction} ;
\node[below=0.1cm of k2s,align=center] (D) {{\color{blue}Démonstrateur}} ;
\end{tikzpicture}
\end{center}


\newpage

Le code ci-dessous permet d'obtenir les figures ci-dessus.

Une fois copié depuis le fichier pdf,
remplacer les stealth' par stealth\textquotesingle.

% Le code ci-dessous permet d'obtenir les figures ci-dessus.
% Une fois copié depuis le fichier pdf,
% remplacer les stealth' par stealth\textquotesingle.

\inputminted{latex}{Figures_tikz.tex}

\end{document}
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