tplot.sty: a simple plotter using tpic-specials

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1 Plotting functions

`\plot{`*numsamples**`}[\`*var*`=`*begin*`:`*end*`;` *yexpr*`]`

`\funcdef\`*name*`(\`*var*`){`*expr*`}`

`\funcdef\`*name*`(\`*var1*`,\`*var2*`){`*expr*`}`

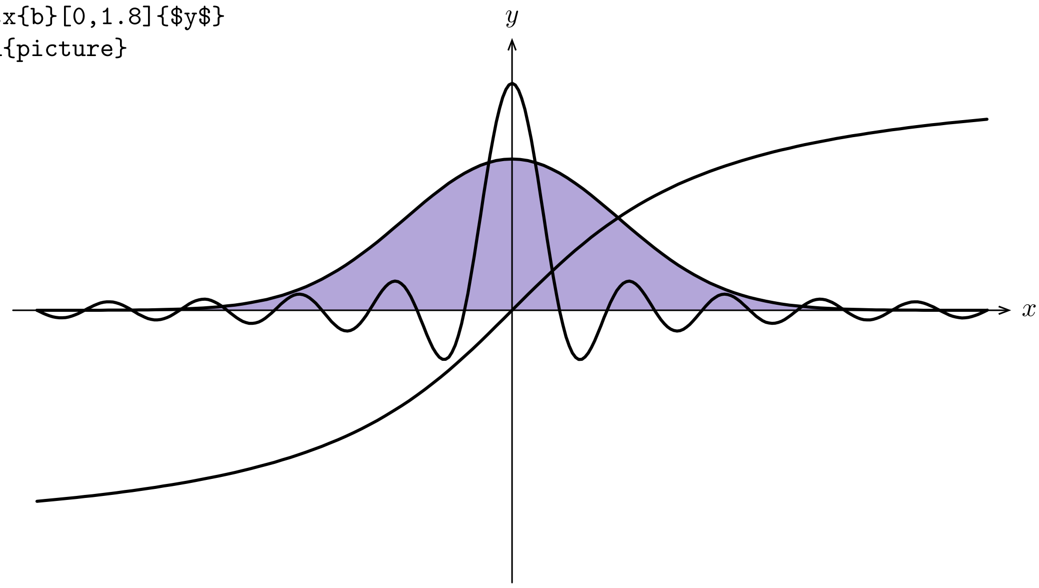
Builtin functions:

`\sin(\x), \cos(\x), \tan(\x), \asin(\x), \atan(\x), \atanii(\y,\x),`
`\exp(\x), \log(\x), \sqrt(\x), \abs(\x), \sgn(\x), \max(\x,\y), \min(\x,\y)`

Constants:

`\pi=3.14159, \e=2.71828, \deg=\pi/180`

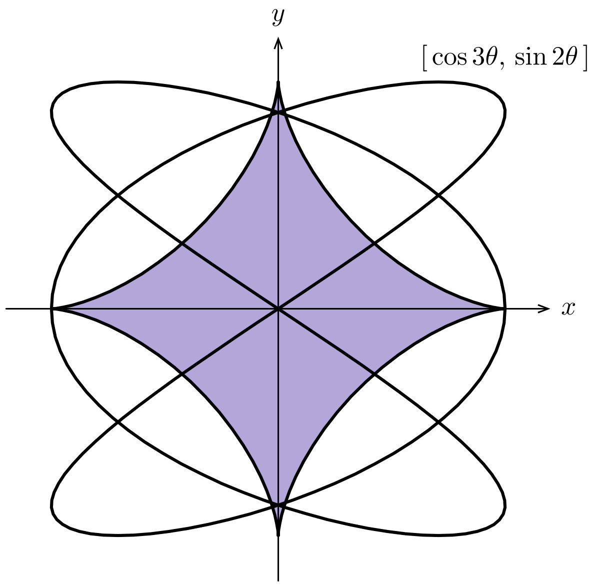
```
\unitlength=20mm
\begin{picture}(6.6,3.6)(-3.3,-1.8)
\setlinewidth{.4mm}
\plot*[\x=-\pi:\pi;\e^(-\x^2)]
\plot [\x=-\pi:\pi;\atan(\x)]
\funcdef\sinc(\x){(\x==0)?{1}:{\sin(\x)/\x}}
\plot300[\x=-\pi:\pi;1.5*\sinc(10*\x)]
\setlinewidth{.2mm}
\linex{->}[-3.3,0][3.3,0]
\linex{->}[0,-1.8][0,1.8]
\putx{l}[3.3,0]{$x$}
\putx{b}[0,1.8]{$y$}
\end{picture}
```



2 Plotting parametric curves

\plot{*numsamples**}[*var*=*begin* : *end* ; *xexpr*, *yexpr*]

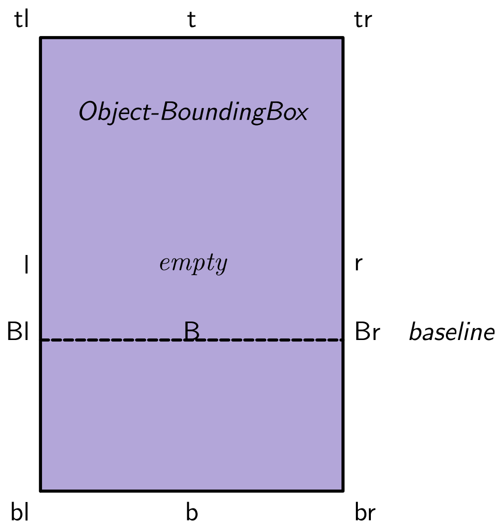
```
\unitlength=30mm
\begin{picture}(2.4,2.4)(-1.2,-1.2)
\setlinewidth{.4mm}
\plot100*[\theta=-\pi:\pi;
  \cos(\theta)^3,\sin(\theta)^3]
\plot200 [\theta=-\pi:\pi;
  \cos(3*\theta),\sin(2*\theta)]
\setlinewidth{.2mm}
\linex{->}[-1.2,0][1.2,0]
\linex{->}[0,-1.2][0,1.2]
\putx{l}[1.2,0]{$x$}
\putx{b}[0,1.2]{$y$}
\putx{b}[1,1]
  {$[\,\cos3\theta,\,\sin2\theta\,]$}
\end{picture}
```



3 Put objects

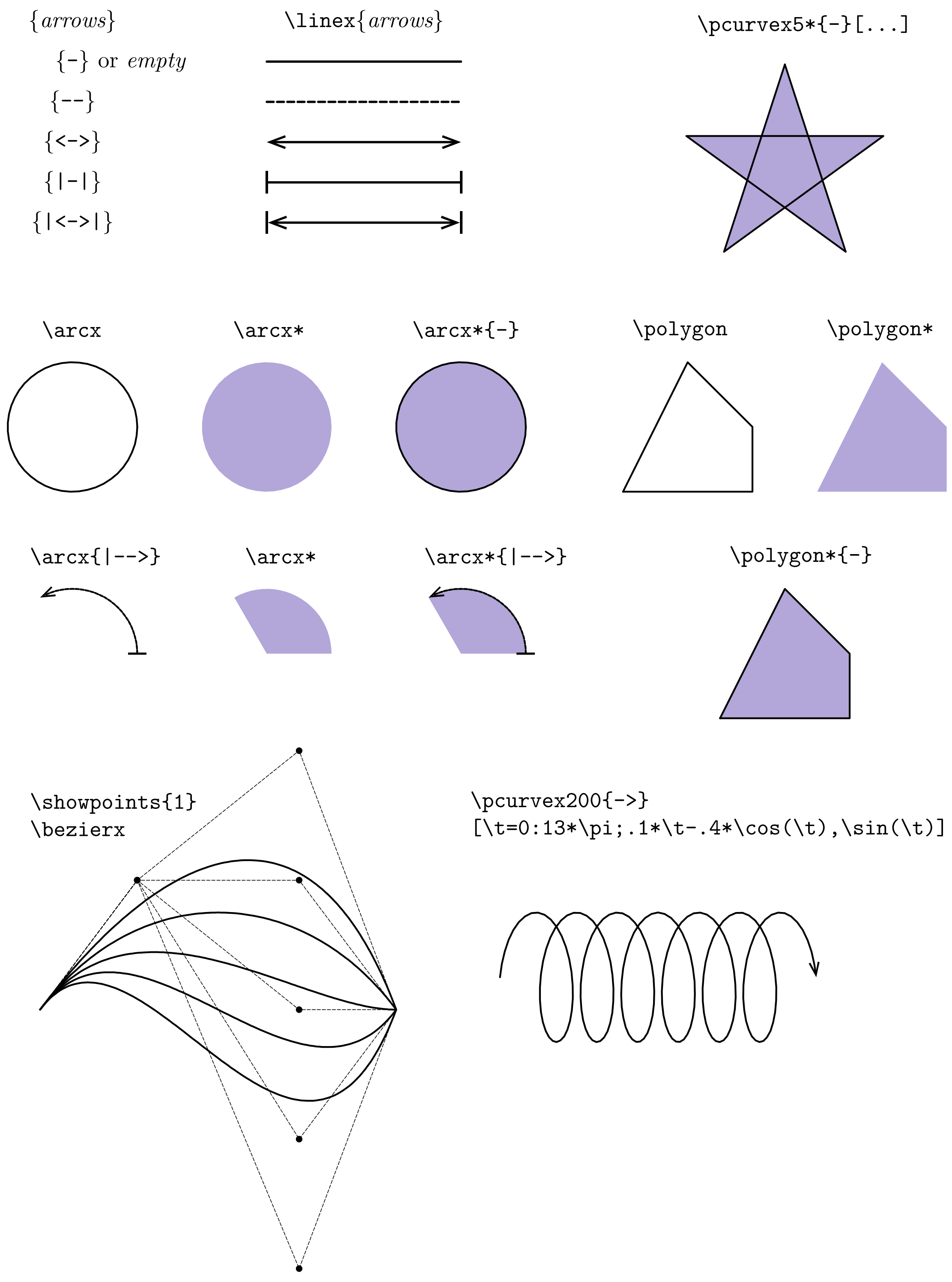
\putx{*reference-point*}[x, y]{*object*}
\setlabelsep{*skip*} (default = 4 pt)

```
\unitlength=20mm
\begin{picture}(2,3)(-1,-1)
\setlinewidth{.4mm}
\polygon*{-}[-1,-1][1,-1][1,2][-1,2]
\linex{--}[-1,0][1,0]
\putx{br}[-1,2.]{\sf tl}
\putx{b} [ 0,2.]{\sf t}
\putx{bl}[ 1,2.]{\sf tr}
\putx{r} [-1,.5]{\sf l}
\putx    [ 0,.5]{\it empty}
\putx{l} [ 1,.5]{\sf r}
\putx{Br}[-1,.0]{\sf Bl}
\putx{B} [ 0,.0]{\sf B}
\putx{Bl}[ 1,.0]{\sf Br}
\putx{tr}[-1,-1]{\sf bl}
\putx{t} [ 0,-1]{\sf b}
\putx{tl}[ 1,-1]{\sf br}
\end{picture}
```



4 Lines and Curves

\linex{*arrows*}[*x0*, *y0*][*x1*, *y1*]...[*xn*, *yn*]
\arcx*{*arrows*}[*x0*, *y0*; *radius*; *angle0*, *angle1*]
\bezierx{*arrows*}[*x0*, *y0*][*x1*, *y1*][*x2*, *y2*][*x3*, *y3*]
\pcurvex*{*arrows*}[*var*=*begin*:*end*; *xexpr*, *yexpr*]
\polygon*{-}[*x0*, *y0*][*x1*, *y1*]...[*xn*, *yn*]
\setarrowhead{*length*, *width*} (default = {8, 6})
\settbarsize{*length*} (default = {10})



5 Path construction and Paint operators

\moveto[x, y]

\lineto[x, y]

\curveto[$x1, y1\,; x2, y2\,; x3, y3$]

\rmoveto[dx, dy]

\rlineto[dx, dy]

\rcurveto[$dx1, dy1\,; dx2, dy2\,; dx3, dy3$]

\arc[$x0, y0\,;\ radius;\ angle0, angle1$]

\arct[$x1, y1\,; x2, y2\,; radius$]

\pcurve[\\var=$begin$: end; $xexpr$, $yexpr$]

\newpath

\closepath

\stroke$*$

\fillpath

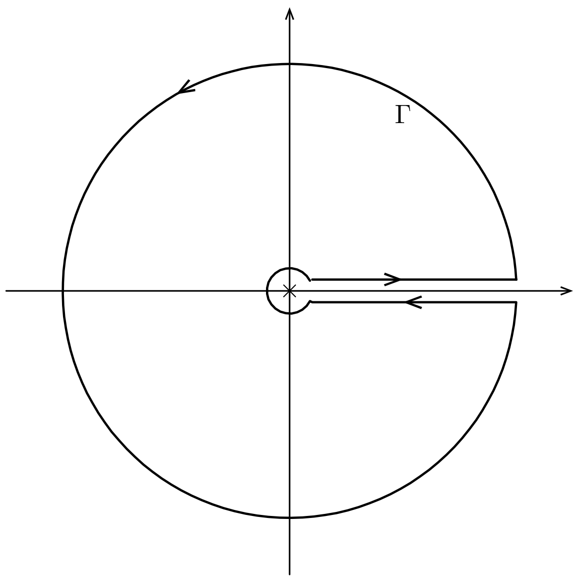
\arrowto[x, y]

\arrowfrom[x, y]

\rarrowto[dx, dy]

\rarrowfrom[dx, dy]

```
\unitlength=15mm
\begin{picture}(4,5)(-2,-2)
\setlinewidth{.3mm}
\eval\ALPHA{\atanii(.1,2.)}
\eval\BETA{\atanii(.1,.2)}
\moveto[.2,.1]
\lineto[1,.1]
{\rarrowfrom[-1,0]}
\lineto[2,.1]
\arc[0,0;2;\ALPHA,2*\pi/3]
{\rarrowfrom[\sqrt(3),1]}
\arc[0,0;2;2*\pi/3,2*\pi-\ALPHA]
\lineto[1,-.1]
{\rarrowfrom[1,0]}
\lineto[.2,-.1]
\arc[0,0;.2;2*\pi-\BETA,\BETA]
\stroke
\setlinewidth{.2mm}
\linex{->}[-2.5,0][2.5,0]
\linex{->}[0,-2.5][0,2.5]
\putx[0,0]{$\times$}
\putx{t}[1,\sqrt(3)]{$\Gamma$}
\end{picture}
```



6 Coordinate system and Matrix operators

`\initmatrix`
`\setmatrix[`a,b,c,d,e,f`]`
`\translate[`x,y`]`
`\scale[`*xscale*, *yscale*`]`
`\rotate[`*angle*`]`
`\rotateat[`x,y`;`*angle*`]`
`\concat[`a,b,c,d,e,f`]`
`\transform[`*dimen1*`,`*dimen2*`]`
`\dtransform[`*dimen1*`,`*dimen2*`]`
`\itransform[`*dimen1*`,`*dimen2*`]`
`\idtransform[`*dimen1*`,`*dimen2*`]`

7 Graphic state operators

`\gsave`
`\grestore`
`\setlinewidth{`*linethickness*`}`
`\setlinejoin{`*integer*`}`
`\setlinestyle{`solid/dash/spline`}`
`\setfillcolor[`rgb`]{`*red, green, blue*`}`
`\setstrokecolor[`rgb`]{`*red, green, blue*`}`
`\setcolor[`rgb`]{`*red, green, blue*`}`

8 Calcurator and Others

`\eval\`*name*`{`*expr*`}`	define *name* to be the result value
`\evald\`*var*`{`*expr*`}`	stored in the dimen resister (as *value* pt)
`\?{`*expr*`}`	typeout the result to console
`\solve{`*?*`}[\`*var*`=`a`:`b`;`*expr*`]`	find the root in (a,b) of *expr*=0
`\for[\`*var*`=`*init*`;`*cond*`;\`*var*`+=`*incr*`]{`*proc*`}`	for statement

```
\evald{\dimen255}{\linewidth/5}
\for[\nn=1;\nn<=225;\nn+=1]{%
  \eval\xx{\sqrt(\nn)}%
  \hbox to\dimen255{\hskip2em\llap{$\sqrt{\nn}$} = \xx,\hss}%
  \hskip0pt plus1sp
}
```

$\sqrt{1} = 1$,	$\sqrt{2} = 1.41422$,	$\sqrt{3} = 1.73206$,	$\sqrt{4} = 2$,	$\sqrt{5} = 2.23607$,
$\sqrt{6} = 2.4495$,	$\sqrt{7} = 2.64575$,	$\sqrt{8} = 2.82843$,	$\sqrt{9} = 3$,	$\sqrt{10} = 3.16228$,
$\sqrt{11} = 3.31664$,	$\sqrt{12} = 3.46411$,	$\sqrt{13} = 3.60556$,	$\sqrt{14} = 3.74165$,	$\sqrt{15} = 3.87299$,
$\sqrt{16} = 4$,	$\sqrt{17} = 4.12311$,	$\sqrt{18} = 4.24265$,	$\sqrt{19} = 4.3589$,	$\sqrt{20} = 4.47214$,
$\sqrt{21} = 4.58258$,	$\sqrt{22} = 4.69041$,	$\sqrt{23} = 4.79584$,	$\sqrt{24} = 4.89899$,	$\sqrt{25} = 5$,
$\sqrt{26} = 5.09903$,	$\sqrt{27} = 5.19615$,	$\sqrt{28} = 5.2915$,	$\sqrt{29} = 5.38516$,	$\sqrt{30} = 5.47723$,
$\sqrt{31} = 5.56776$,	$\sqrt{32} = 5.65686$,	$\sqrt{33} = 5.74457$,	$\sqrt{34} = 5.83095$,	$\sqrt{35} = 5.91608$,
$\sqrt{36} = 6$,	$\sqrt{37} = 6.08276$,	$\sqrt{38} = 6.16441$,	$\sqrt{39} = 6.245$,	$\sqrt{40} = 6.32455$,
$\sqrt{41} = 6.40312$,	$\sqrt{42} = 6.48074$,	$\sqrt{43} = 6.55745$,	$\sqrt{44} = 6.63326$,	$\sqrt{45} = 6.7082$,
$\sqrt{46} = 6.78233$,	$\sqrt{47} = 6.85565$,	$\sqrt{48} = 6.9282$,	$\sqrt{49} = 7$,	$\sqrt{50} = 7.07108$,
$\sqrt{51} = 7.14143$,	$\sqrt{52} = 7.2111$,	$\sqrt{53} = 7.28012$,	$\sqrt{54} = 7.34848$,	$\sqrt{55} = 7.4162$,
$\sqrt{56} = 7.48332$,	$\sqrt{57} = 7.54984$,	$\sqrt{58} = 7.61578$,	$\sqrt{59} = 7.68115$,	$\sqrt{60} = 7.74597$,
$\sqrt{61} = 7.81026$,	$\sqrt{62} = 7.87401$,	$\sqrt{63} = 7.93726$,	$\sqrt{64} = 8$,	$\sqrt{65} = 8.06226$,
$\sqrt{66} = 8.12404$,	$\sqrt{67} = 8.18536$,	$\sqrt{68} = 8.24622$,	$\sqrt{69} = 8.30663$,	$\sqrt{70} = 8.36661$,
$\sqrt{71} = 8.42615$,	$\sqrt{72} = 8.48529$,	$\sqrt{73} = 8.544$,	$\sqrt{74} = 8.60233$,	$\sqrt{75} = 8.66026$,
$\sqrt{76} = 8.7178$,	$\sqrt{77} = 8.77496$,	$\sqrt{78} = 8.83177$,	$\sqrt{79} = 8.8882$,	$\sqrt{80} = 8.94427$,
$\sqrt{81} = 9$,	$\sqrt{82} = 9.05539$,	$\sqrt{83} = 9.11044$,	$\sqrt{84} = 9.16516$,	$\sqrt{85} = 9.21954$,
$\sqrt{86} = 9.27362$,	$\sqrt{87} = 9.32738$,	$\sqrt{88} = 9.38083$,	$\sqrt{89} = 9.43399$,	$\sqrt{90} = 9.48683$,
$\sqrt{91} = 9.5394$,	$\sqrt{92} = 9.59166$,	$\sqrt{93} = 9.64366$,	$\sqrt{94} = 9.69536$,	$\sqrt{95} = 9.7468$,
$\sqrt{96} = 9.79796$,	$\sqrt{97} = 9.84886$,	$\sqrt{98} = 9.8995$,	$\sqrt{99} = 9.94987$,	$\sqrt{100} = 10$,
$\sqrt{101} = 10.04988$,	$\sqrt{102} = 10.0995$,	$\sqrt{103} = 10.1489$,	$\sqrt{104} = 10.19804$,	$\sqrt{105} = 10.24695$,
$\sqrt{106} = 10.29564$,	$\sqrt{107} = 10.34409$,	$\sqrt{108} = 10.3923$,	$\sqrt{109} = 10.4403$,	$\sqrt{110} = 10.4881$,
$\sqrt{111} = 10.53566$,	$\sqrt{112} = 10.58301$,	$\sqrt{113} = 10.63014$,	$\sqrt{114} = 10.67708$,	$\sqrt{115} = 10.72382$,
$\sqrt{116} = 10.77034$,	$\sqrt{117} = 10.81665$,	$\sqrt{118} = 10.86278$,	$\sqrt{119} = 10.90872$,	$\sqrt{120} = 10.95445$,
$\sqrt{121} = 11$,	$\sqrt{122} = 11.04536$,	$\sqrt{123} = 11.09055$,	$\sqrt{124} = 11.13553$,	$\sqrt{125} = 11.18034$,
$\sqrt{126} = 11.22498$,	$\sqrt{127} = 11.26942$,	$\sqrt{128} = 11.3137$,	$\sqrt{129} = 11.35782$,	$\sqrt{130} = 11.40176$,
$\sqrt{131} = 11.44553$,	$\sqrt{132} = 11.48914$,	$\sqrt{133} = 11.53256$,	$\sqrt{134} = 11.57584$,	$\sqrt{135} = 11.61896$,
$\sqrt{136} = 11.66191$,	$\sqrt{137} = 11.7047$,	$\sqrt{138} = 11.74734$,	$\sqrt{139} = 11.78983$,	$\sqrt{140} = 11.83217$,
$\sqrt{141} = 11.87434$,	$\sqrt{142} = 11.91638$,	$\sqrt{143} = 11.95827$,	$\sqrt{144} = 12$,	$\sqrt{145} = 12.0416$,
$\sqrt{146} = 12.08305$,	$\sqrt{147} = 12.12436$,	$\sqrt{148} = 12.16553$,	$\sqrt{149} = 12.20656$,	$\sqrt{150} = 12.24745$,
$\sqrt{151} = 12.28821$,	$\sqrt{152} = 12.32883$,	$\sqrt{153} = 12.36932$,	$\sqrt{154} = 12.40968$,	$\sqrt{155} = 12.4499$,
$\sqrt{156} = 12.49$,	$\sqrt{157} = 12.52997$,	$\sqrt{158} = 12.56981$,	$\sqrt{159} = 12.60953$,	$\sqrt{160} = 12.64911$,
$\sqrt{161} = 12.68858$,	$\sqrt{162} = 12.72792$,	$\sqrt{163} = 12.76715$,	$\sqrt{164} = 12.80626$,	$\sqrt{165} = 12.84523$,
$\sqrt{166} = 12.88411$,	$\sqrt{167} = 12.92285$,	$\sqrt{168} = 12.96149$,	$\sqrt{169} = 13$,	$\sqrt{170} = 13.0384$,
$\sqrt{171} = 13.0767$,	$\sqrt{172} = 13.11488$,	$\sqrt{173} = 13.15295$,	$\sqrt{174} = 13.1909$,	$\sqrt{175} = 13.22876$,
$\sqrt{176} = 13.26651$,	$\sqrt{177} = 13.30414$,	$\sqrt{178} = 13.34167$,	$\sqrt{179} = 13.37909$,	$\sqrt{180} = 13.41641$,
$\sqrt{181} = 13.45363$,	$\sqrt{182} = 13.49074$,	$\sqrt{183} = 13.52776$,	$\sqrt{184} = 13.56467$,	$\sqrt{185} = 13.60147$,
$\sqrt{186} = 13.63818$,	$\sqrt{187} = 13.6748$,	$\sqrt{188} = 13.71132$,	$\sqrt{189} = 13.74773$,	$\sqrt{190} = 13.78406$,
$\sqrt{191} = 13.82028$,	$\sqrt{192} = 13.85641$,	$\sqrt{193} = 13.89244$,	$\sqrt{194} = 13.92839$,	$\sqrt{195} = 13.96425$,
$\sqrt{196} = 14$,	$\sqrt{197} = 14.03568$,	$\sqrt{198} = 14.07126$,	$\sqrt{199} = 14.10674$,	$\sqrt{200} = 14.14214$,
$\sqrt{201} = 14.17744$,	$\sqrt{202} = 14.21268$,	$\sqrt{203} = 14.2478$,	$\sqrt{204} = 14.28287$,	$\sqrt{205} = 14.31783$,
$\sqrt{206} = 14.3527$,	$\sqrt{207} = 14.3875$,	$\sqrt{208} = 14.42221$,	$\sqrt{209} = 14.45683$,	$\sqrt{210} = 14.49138$,
$\sqrt{211} = 14.52585$,	$\sqrt{212} = 14.56023$,	$\sqrt{213} = 14.59453$,	$\sqrt{214} = 14.62874$,	$\sqrt{215} = 14.66289$,
$\sqrt{216} = 14.69695$,	$\sqrt{217} = 14.73093$,	$\sqrt{218} = 14.76483$,	$\sqrt{219} = 14.79865$,	$\sqrt{220} = 14.8324$,
$\sqrt{221} = 14.86607$,	$\sqrt{222} = 14.89967$,	$\sqrt{223} = 14.93318$,	$\sqrt{224} = 14.96663$,	$\sqrt{225} = 15$,

```
\begin{picture}(0,6)(-6,-1)
\solve[\x=-1:1;\x^2-2*\x+1-(\x+1)]\edef\a{\x}
\solve[\x= 1:4;\x^2-2*\x+1-(\x+1)]\edef\b{\x}
\eval\m{(\a+\b)/2}
\gsave
 \setcolor[rgb]{.6,.65,.75}
 \pcurve[\x=\a:\b;\x,\x^2-2*\x+1]
 \closepath\fillpath
 \setcolor[rgb]{.6,.75,.65}
 \pcurve [\x=\a:\b;\x,\x^2-2*\x+1]
 \pcurve2[\x=\b:\m;\x,(2*\b-2)*(\x-\b)+(\b^2-2*\b+1)]
 \closepath\fillpath
\grestore
\setlinewidth{.4mm}
\plot[\x=-1.2:3.4;\x^2-2*\x+1]
\plot2[\x=-1.2:3.6;\x+1]
\setlinewidth{.2mm}
\plot2[\x=-1.2:2.1;(2*\a-2)*(\x-\a)+(\a^2-2*\a+1)]
\plot2[\x= 1.1:3.4;(2*\b-2)*(\x-\b)+(\b^2-2*\b+1)]
\setlinewidth{.2mm}
\linex{->}[-1.2,0][3.8,0]
\linex{->}[0,-2.8][0,5.8]
\putx{l}[3.8,0]{$x$}
\putx{b}[0,5.8]{$y$}
\setcolor[rgb]{0,0,0}
\putx[1.25, 1]{$S_{1}$}
\putx[1.4,-.5]{$S_{2}$}
\end{picture}
```