PDF Graphics Operators

by Guillaume Endignoux

Definitions

Postfix notation

op	*foo bar*	→ written in file as "`foo bar op`"

Filling rules

nonzero   even-odd
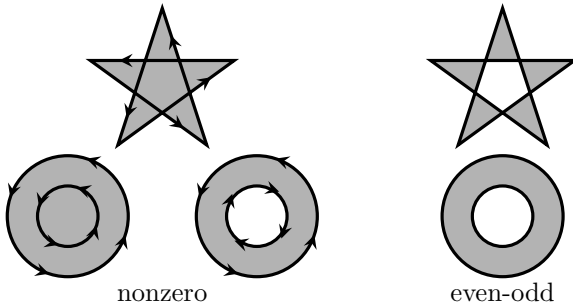
Matrix

$$a\ b\ c\ d\ e\ f \mapsto \begin{pmatrix} a & b & 0 \\ c & d & 0 \\ e & f & 1 \end{pmatrix}$$

Graphics state

General

w	*lineWidth*	set line width
J	*lineCap*	set cap style
j	*lineJoin*	set join style
M	*miterLimit*	set miter limit
d	*dashArray dashPhase*	set dash pattern
ri	*intent*	set color rendering intent
i	*flatness*	set flatness tolerance
gs	*dictName*	set graphics state parameters

Special

q		save state
Q		restore state
cm	*a b c d e f*	set transformation matrix

Images

Do	*name*	paint XObject
BI		begin inline image
ID		begin inline image data
EI		end inline image

Path

Construction

m	*x y*	move to
l	*x y*	line to
c	$x_1\ y_1\ x_2\ y_2\ x_3\ y_3$	cubic Bézier to
v	$x_2\ y_2\ x_3\ y_3$	Bézier with $(x_1, y_1) = $ current
y	$x_1\ y_1\ x_3\ y_3$	Bézier with $(x_2, y_2) = (x_3, y_3)$
h		close path
re	*x y width height*	rectangle with $(x, y) = $ low-left

Clipping

W	intersect + set clipping (nonzero rule)
W*	intersect + set clipping (even-odd rule)

Painting

S	stroke
s	close + stroke
f	fill (nonzero rule)
F	deprecated, same as f
f*	fill (even-odd rule)
B	fill + stroke (nonzero rule)
B*	fill + stroke (even-odd rule)
b	close + fill + stroke (nonzero rule)
b*	close + fill + stroke (even-odd rule)
n	end path (no-op)

Text

Objects

BT	begin text
ET	end text

State

Tc	*charSpace*	set char spacing
Tw	*wordSpace*	set word spacing
Tz	*scale*	set horiz. scaling (in percent)
TL	*leading*	set text leading
Tf	*font size*	set font + size
Tr	*render*	set text rendering mode
Ts	*rise*	set text rise

Positioning

Td	$t_x\ t_y$	next line (w.r.t start of current line)
TD	$t_x\ t_y$	next line + set text leading
Tm	*a b c d e f*	set text matrix
T*		next line

Showing

Tj	*string*	show string
'	*string*	next line + show string
"	$a_w\ a_c$ *string*	set spacings + next line + show
TJ	*array*	show strings (+ manual spacing)

Color

Stroking

CS	*name*	set color space
SC	$c_1...c_n$	set color
SCN	$c_1...c_n$ *[name]*	set color
G	*gray*	set gray color
RG	*r g b*	set RGB color
K	*c m y k*	set CMYK color

Non-stroking

Same operators as stroking but in `lowercase`.

Misc

Type 3 fonts

d0	$w_x\ w_y$	glyph width
d1	$w_x\ w_y\ ll_x\ ll_y\ ur_x\ ur_y$	width + bounding box

Marked content

MP	*tag*	marked-content point
DP	*tag props*	point with properties
BMC	*tag*	begin marked-content sequence
BDC	*tag props*	begin sequence with properties
EMC		end marked-content sequence

Other

sh	*name*	paint shading to clipping path
BX		begin compatibility section
EX		end compatibility section