

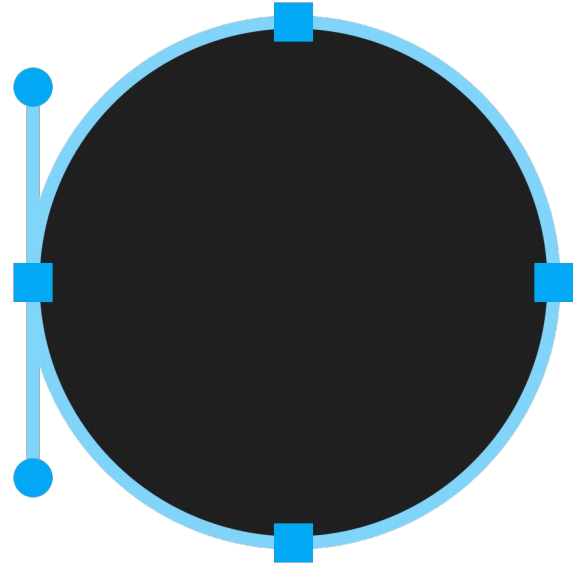
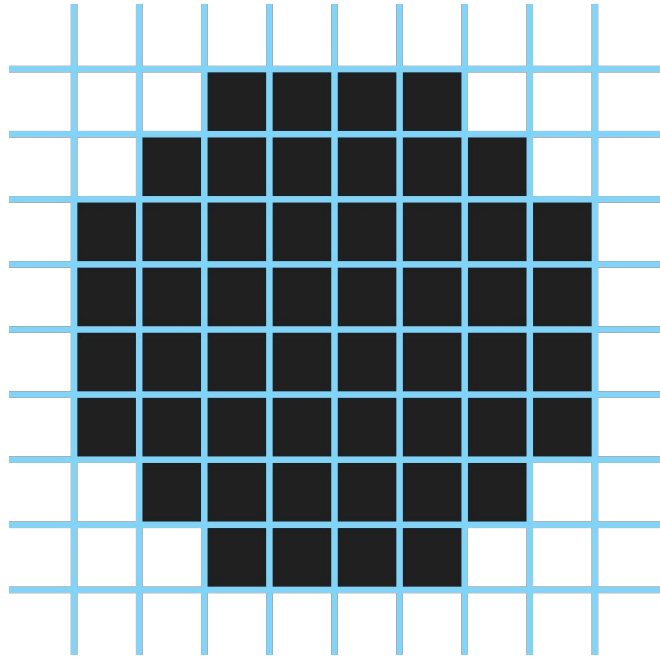
Intro to SVGs

(for academic folk)

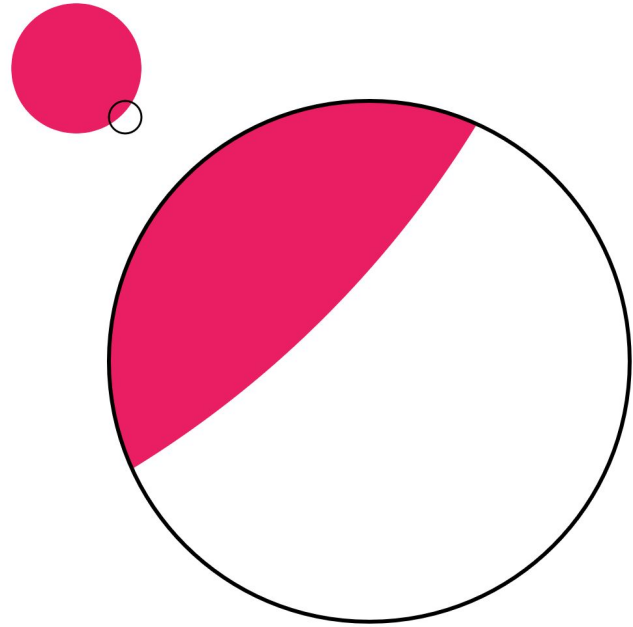
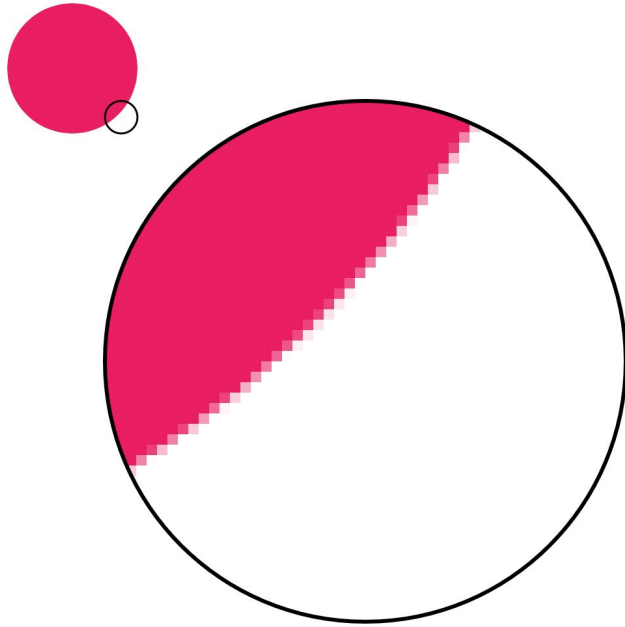
*Scalable **Vector** Graphics*

Background

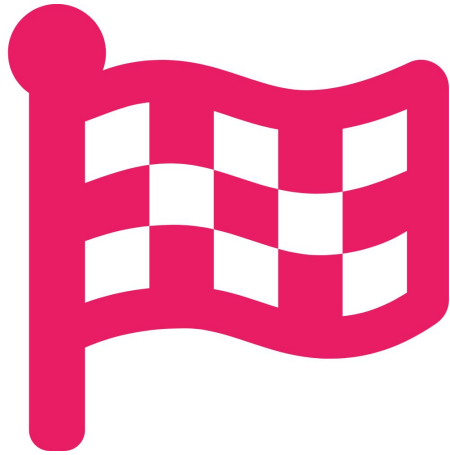
Raster vs Vector



Raster vs Vector



Limitations of Vector Graphics



The <svg> tag

```
<svg  
  xmlns="http://www.w3.org/2000/svg"  
  viewBox="..."  
  width="..."  
  height="..."  
>  
  ...  
</svg>
```

How SVGs are written

```
<element attribute="value">  
  <child attribute="value">  
    ... more content ...  
  </child>  
  <child attribute="value" />  
</element>  
<!-- comment -->
```

What is SVG



Basics I

Units

Absolute

1px = 1

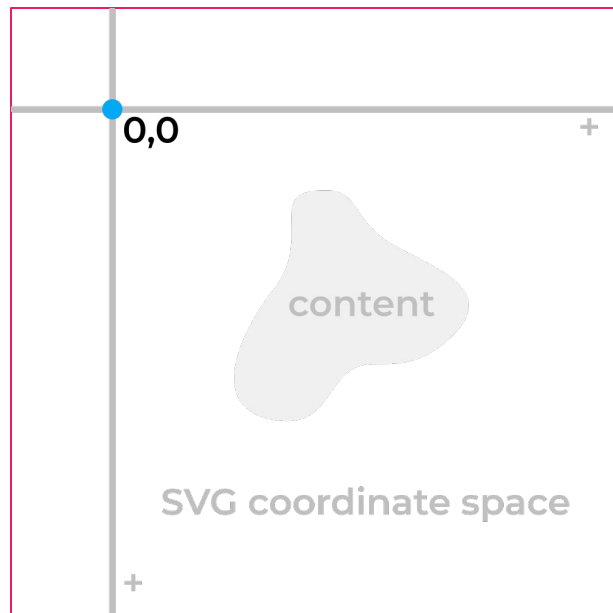
1in = 96

1cm = 37.795

1pt = 1.333

Relative

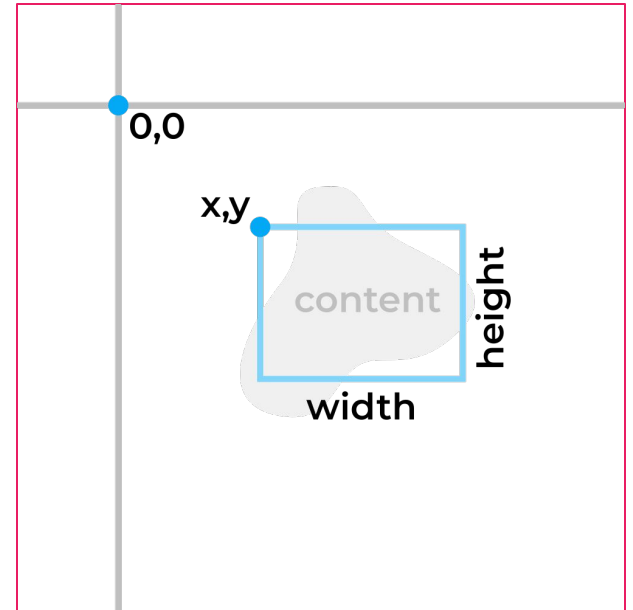
1em = current font size



viewBox

```
viewBox="x y width height"
```

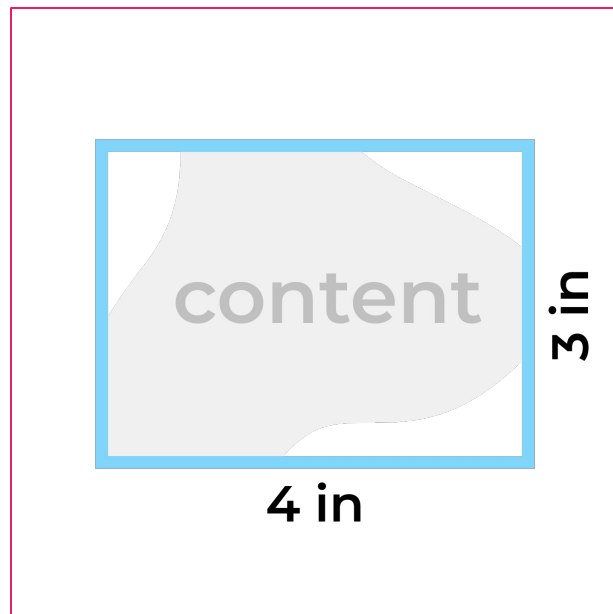
```
viewBox="70 60 100 75"
```



Width and height

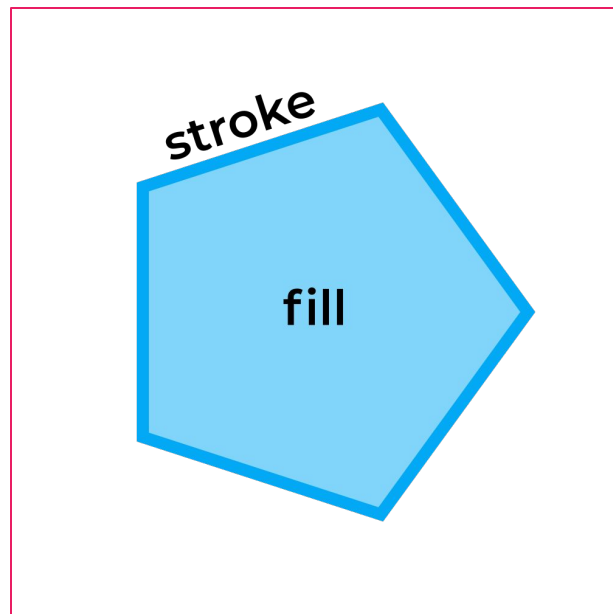
```
width="..." height="..."
```

```
width="4in" height="3in"
```



Stroke and fill

```
fill="..." stroke="..."  
fill="skyblue" stroke="blue"
```



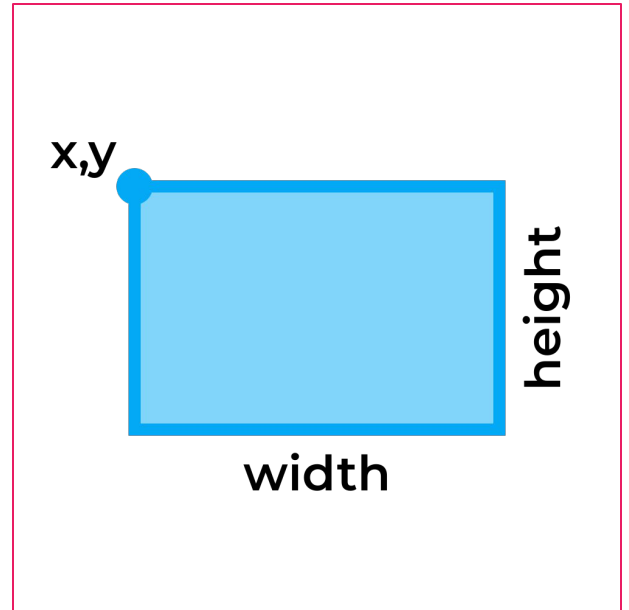
Color

| | Normal, opaque | With transparency |
|-----------------------------------|------------------|------------------------|
| Named | red | - |
| Hex | #ff0000 | #ff000080 |
| Red, Green, Blue | rgb(255, 0, 0) | rgba(255, 0, 0, 0.5) |
| Hue, Saturation, Luminance | hsl(0, 0%, 100%) | hsla(0, 0%, 100%, 0.5) |



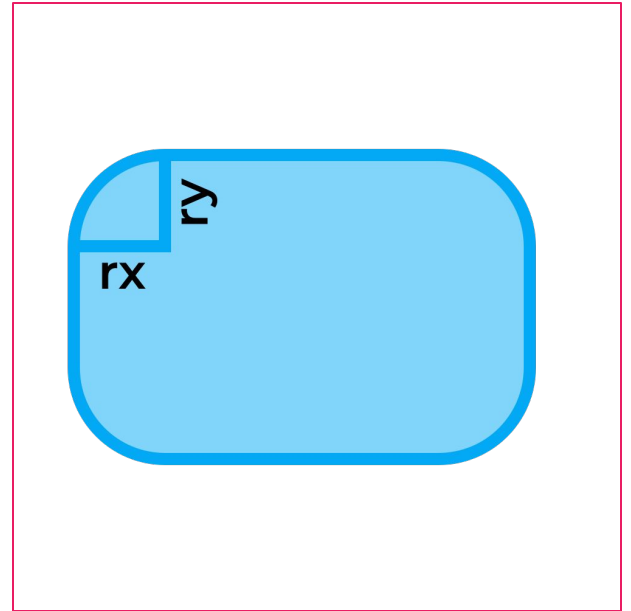
Rectangle

```
<rect  
  x="..."  
  y="..."  
  width="..."  
  height="..."  
>
```



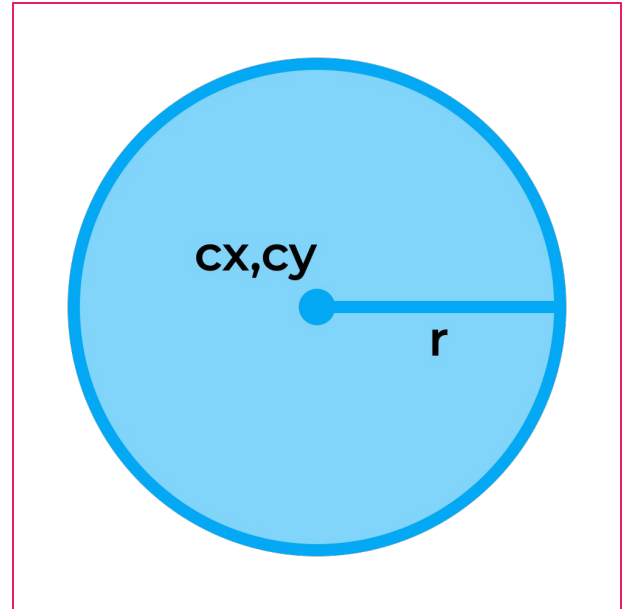
Rounded rectangle

```
rx="..."  
ry="..."
```



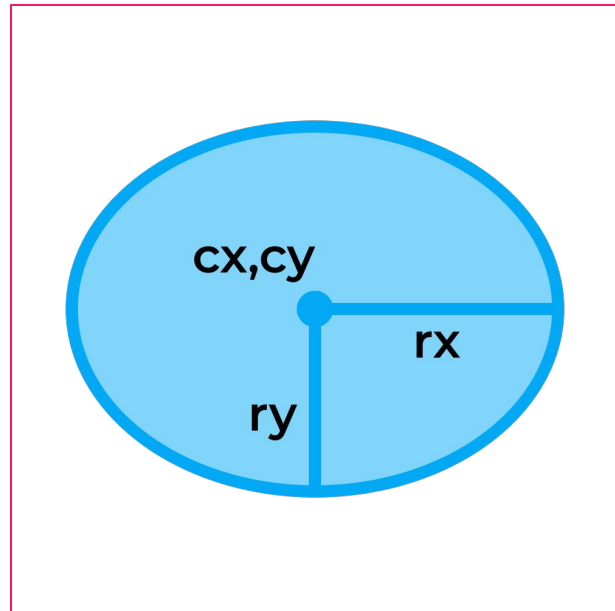
Circle

```
<circle  
  cx="..."  
  cy="..."  
  r="..."  
>
```



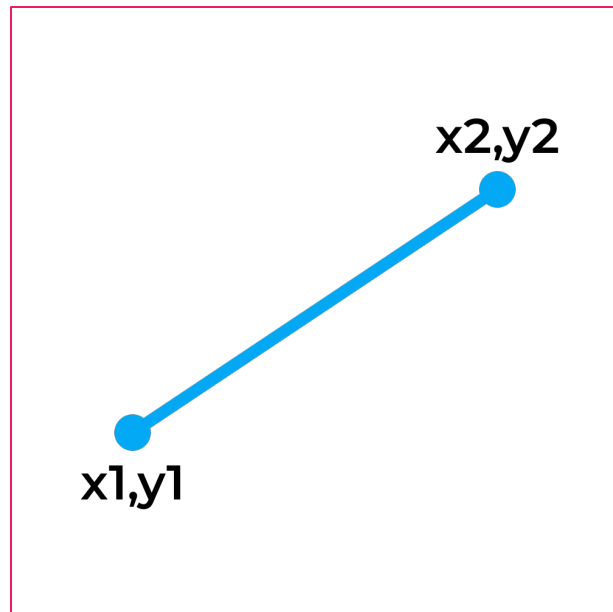
Ellipse

```
<ellipse  
  cx="..."  
  cy="..."  
  ry="..."  
  rx="..."  
>
```



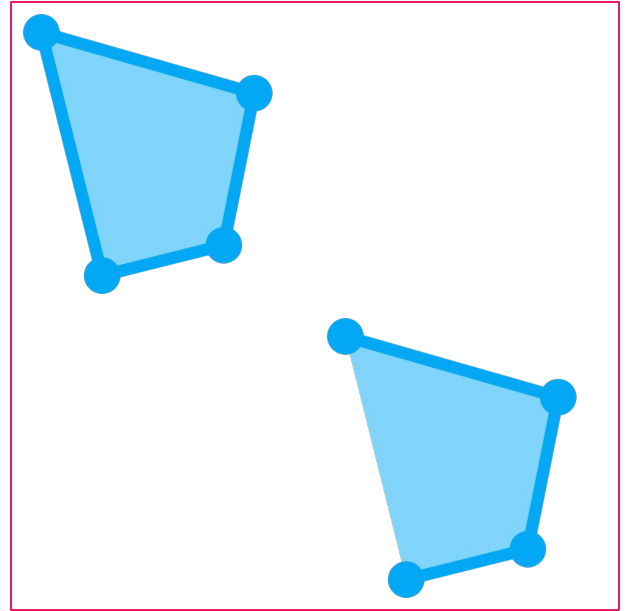
Line

```
<line  
  x1="..."  
  y1="..."  
  x2="..."  
  y2="..."  
>
```



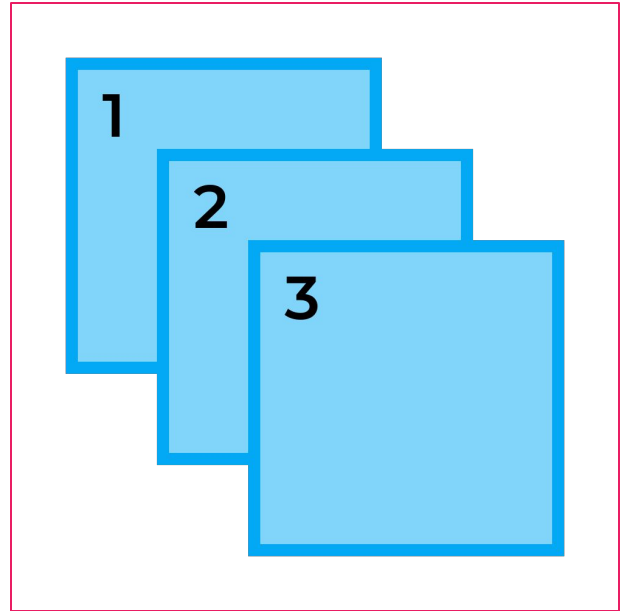
Polygon / polyline

```
<polygon/polyline  
  points="... x y x y ..."  
>
```

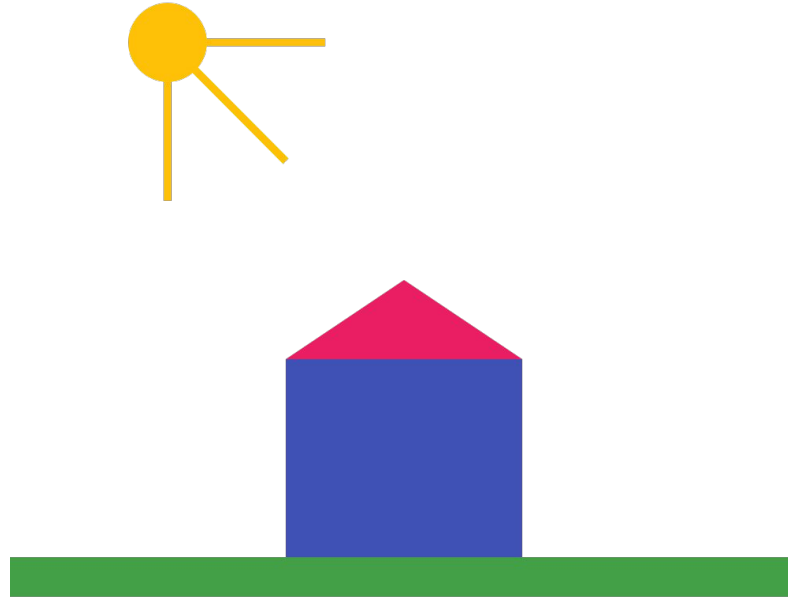


Z-order

```
<!-- 1 -->  
<rect />  
<!-- 2 -->  
<rect />  
<!-- 3 -->  
<rect />
```



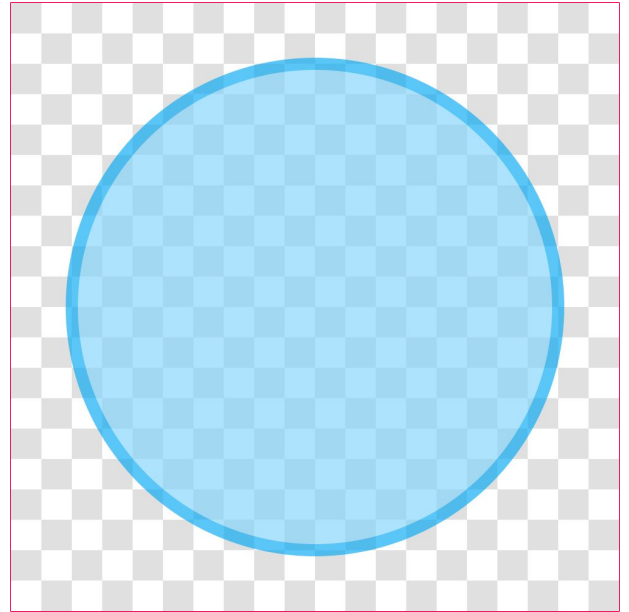
Exercise 1



Basics II

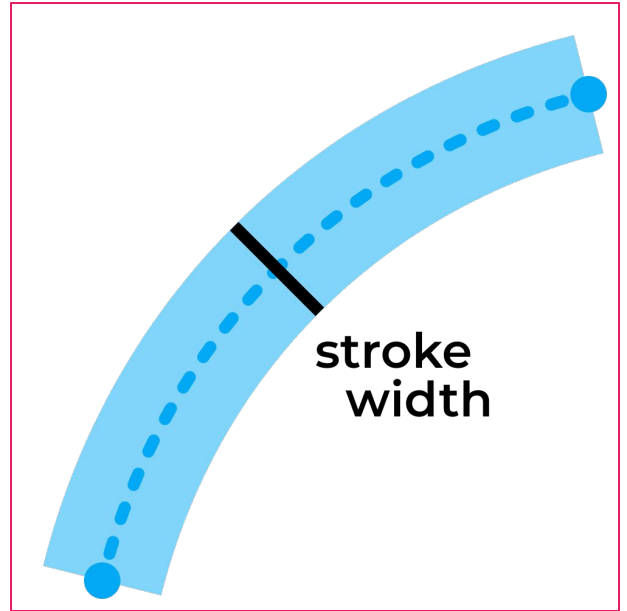
Opacity

```
opacity="..."
```



Stroke width

```
stroke-width="..."
```

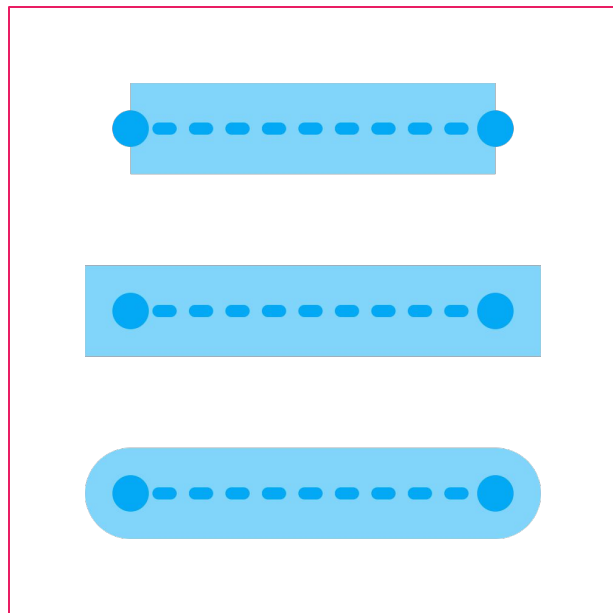


Stroke line cap

```
stroke-linecap="butt"
```

```
stroke-linecap="square"
```

```
stroke-linecap="round"
```

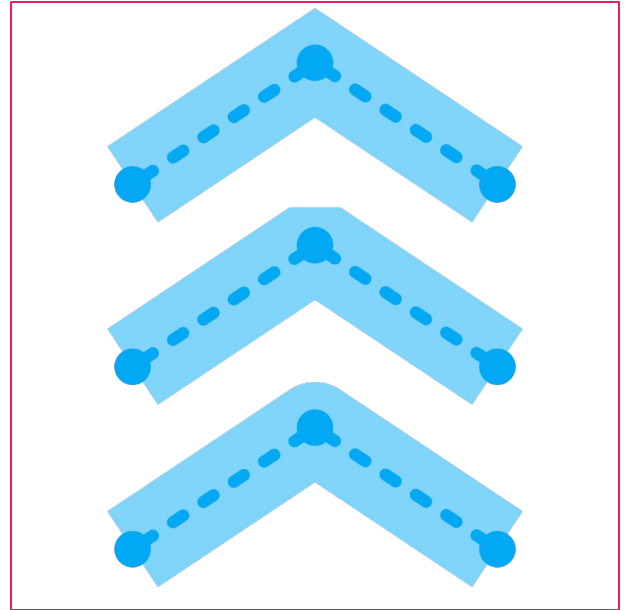


Stroke line join

```
stroke-linejoin="miter"
```

```
stroke-linejoin="bevel"
```

```
stroke-linejoin="round"
```



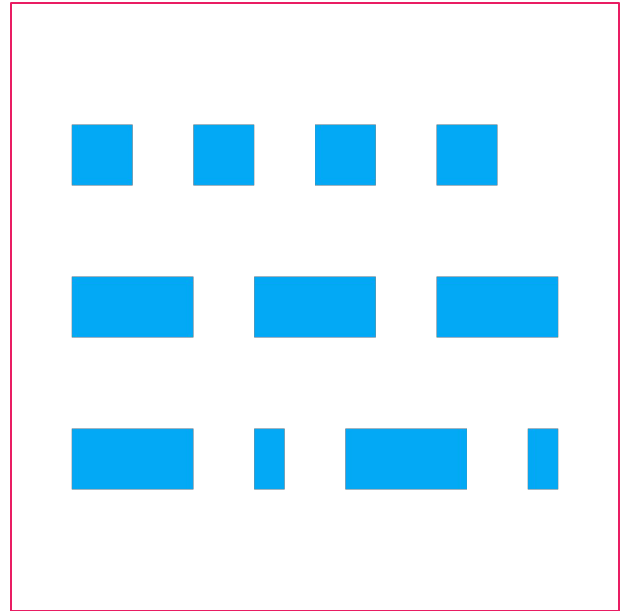
Dashed lines

```
stroke-dasharray="d g d g ..."
```

```
stroke-dasharray="10"
```

```
stroke-dasharray="20 10"
```

```
stroke-dasharray="20 10 5 10"
```

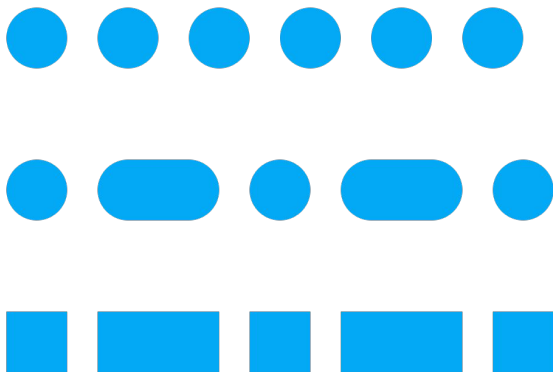


Dotted lines

```
stroke-dasharray="0 15"
```

```
stroke-dasharray="0 15 10 15"
```

```
stroke-dasharray="0 15 10 15"
```



Dash offset

```
stroke-dashoffset="0"
```

```
stroke-dashoffset="-5"
```

```
stroke-dashoffset="-10"
```



Text

```
<text  
  x="..."  
  y="..."  
>  
  Text  
</text>
```



A diagram illustrating a text element. It features a light blue rectangular box with a thin red border. Inside the box, the word "Text" is written in a large, blue, sans-serif font. To the left of the text, there is a small blue dot representing a point. Below this dot, the coordinates "x,y" are written in a black, sans-serif font.

Text style

```
font-family="Montserrat"  
font-size="16"  
font-weight="bold"  
font-style="italic"  
text-decoration="underline"  
letter-spacing="5"
```

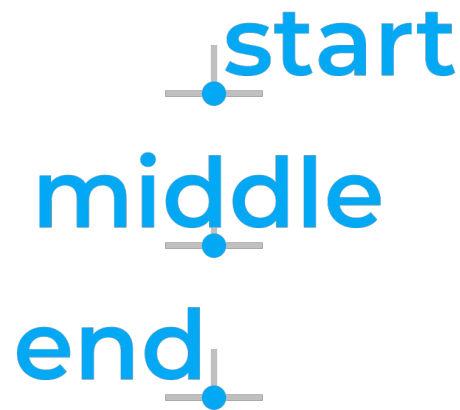
S P O O K Y

Text horizontal align

```
text-anchor="start"
```

```
text-anchor="middle"
```

```
text-anchor="end"
```



Text vertical align

```
dominant-baseline="baseline"
```

```
dominant-baseline="middle"
```

```
dominant-baseline="hanging"
```



baseline

A diagram showing the word 'baseline' in blue. To its left is a vertical grey line with a blue dot at the baseline level. A short horizontal grey line extends from the dot to the first letter of the word.



middle

A diagram showing the word 'middle' in blue. To its left is a vertical grey line with a blue dot at the middle level. A short horizontal grey line extends from the dot to the first letter of the word.



hanging

A diagram showing the word 'hanging' in blue. To its left is a vertical grey line with a blue dot at the top level. A short horizontal grey line extends from the dot to the first letter of the word.

<tspan>

```
<text>  
  grumpy  
  <tspan fill="#e91e63">  
    cat  
  </tspan>  
</text>
```

grumpy cat

<tspan> offset

```
baseline-shift="super"
```

```
baseline-shift="sub"
```

```
dx="..."
```

```
dy="..."
```

grumpy cat²

grumpy
cat

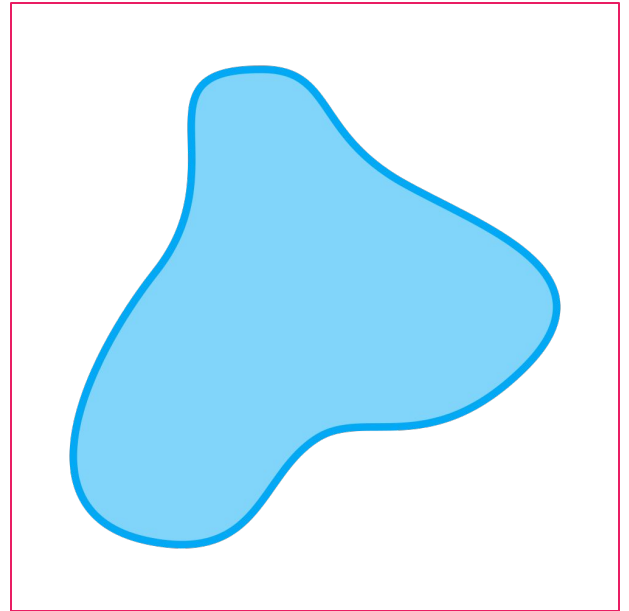
Exercise 2



Intermediate I

Paths

```
<text  
  d="..."  
  fill="..."  
  stroke="..."  
>
```



Path d syntax

```
M 50 50 L 100 100 C 75 100, 50 75, 50 50
```

```
M 50,50 L 100,100 C 75,100 50,75 50,50
```

```
M 50 50
```

```
L 100 100
```

```
C 75 100 50 75 50 50
```


Move to

$M \times y$

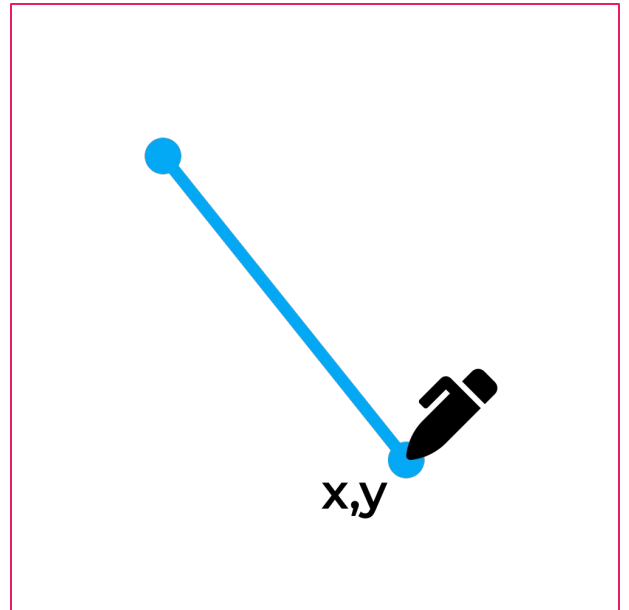


Line to

L x y

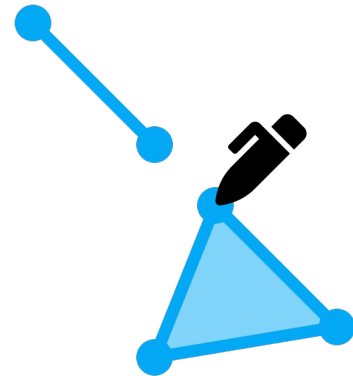
H x

V y



Close

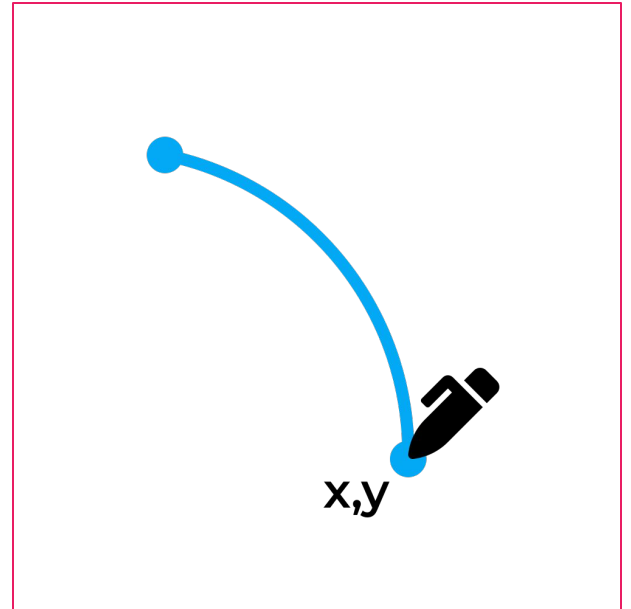
```
M 25 25  
L 45 45  
M 55 55  
L 75 75  
L 45 80  
Z
```



Arc to

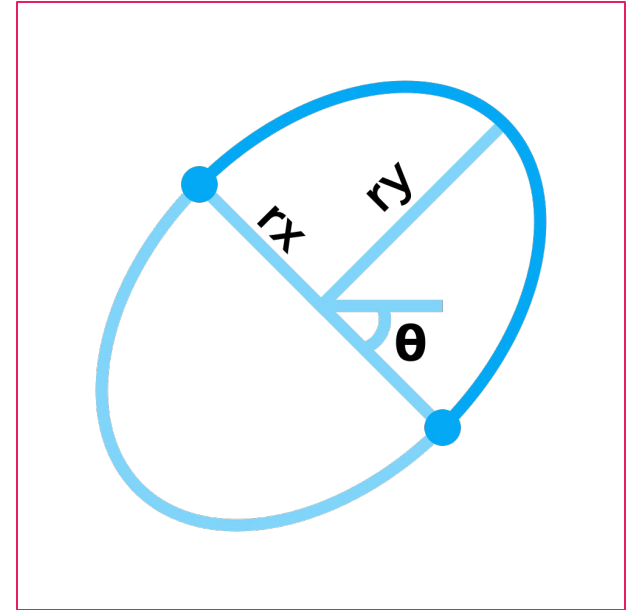
```
A rx ry angle large cw x y
```

```
A 50 50 0 0 1 65 75
```



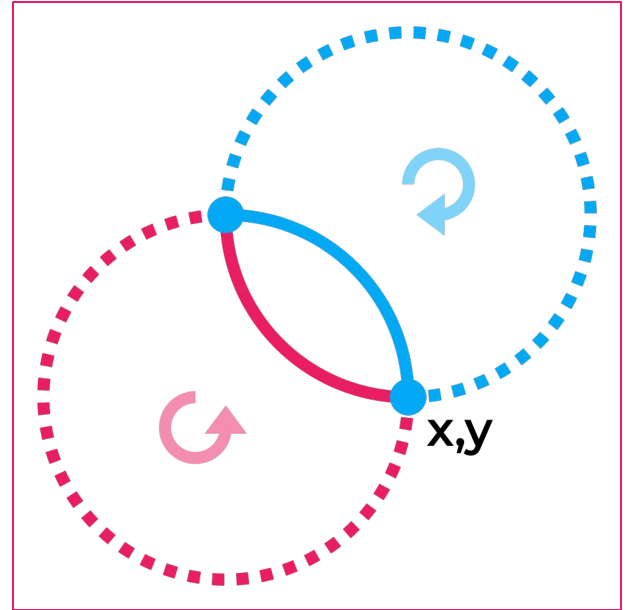
Arc to - radius and rotation

A rx ry angle large cw x y



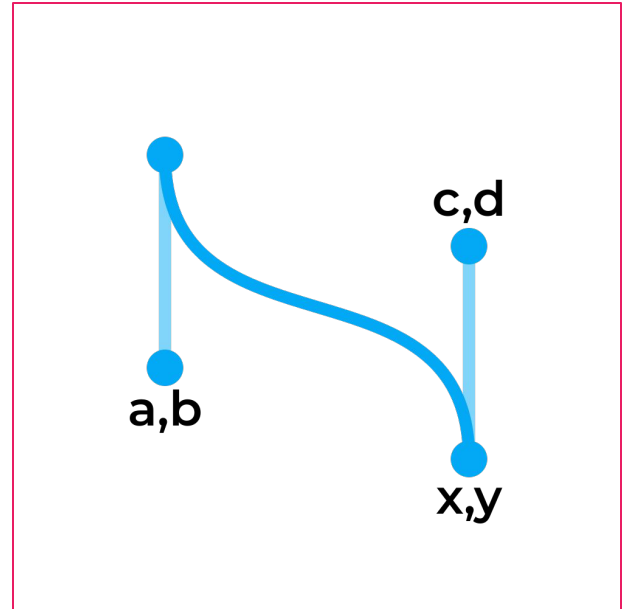
Arc to - flags

A rx ry angle large cw x y



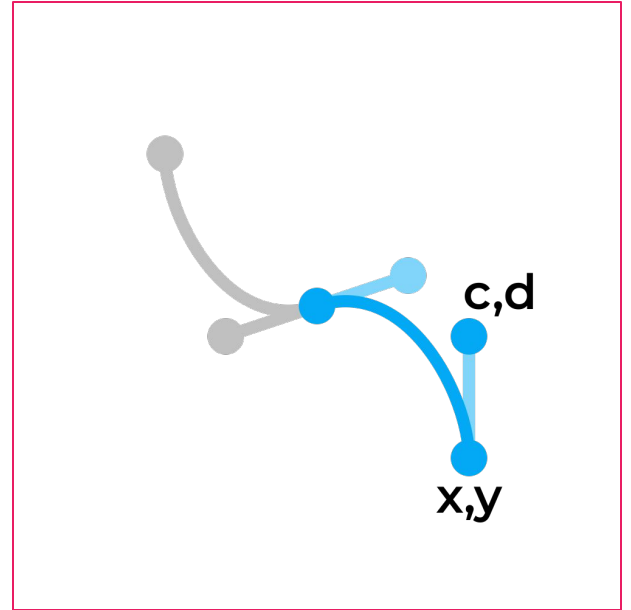
Curve to

C a b c d x y



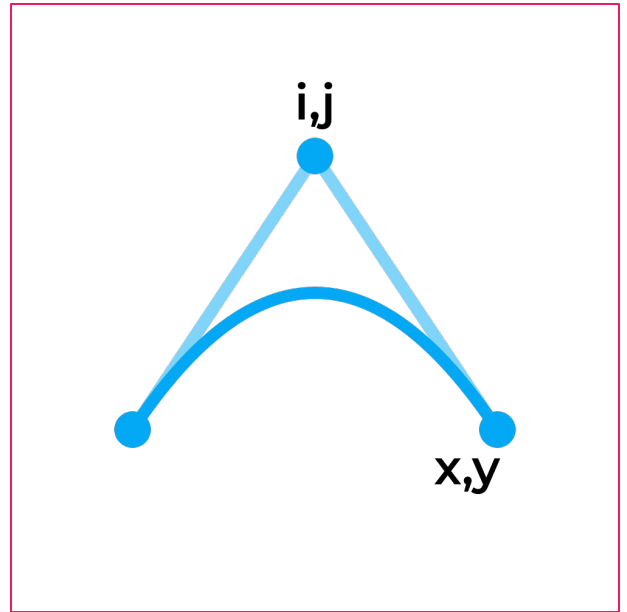
Curve to - shorthand

S c d x y



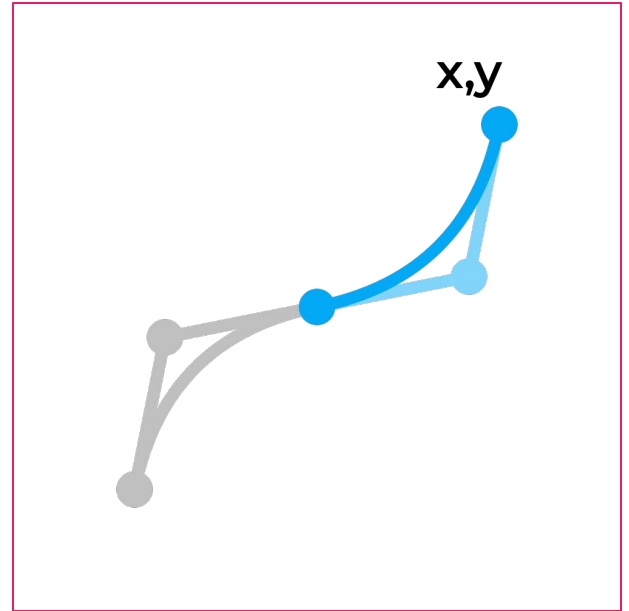
Quadratic to

$Q_{i,j \times y}$



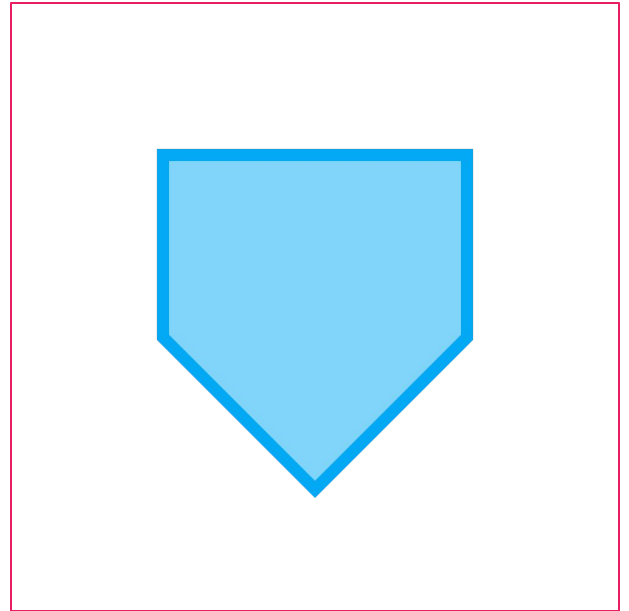
Quadratic to - shorthand

T x y



Relative coordinates

```
M 25 25  
h 50  
v 30  
l -25 25  
l -25 -25  
z
```



Quirks

```
M 25 25
```

```
l 20 0
```

```
0 20
```

```
-20 0
```

```
z
```

```
M 65 50
```

```
A 10 10 0 0 1 65 70
```

```
A 10 10 0 0 1 65 50
```

```
z
```

