# Cohen-Sutherland Clipping (of straight line to rectangular region)

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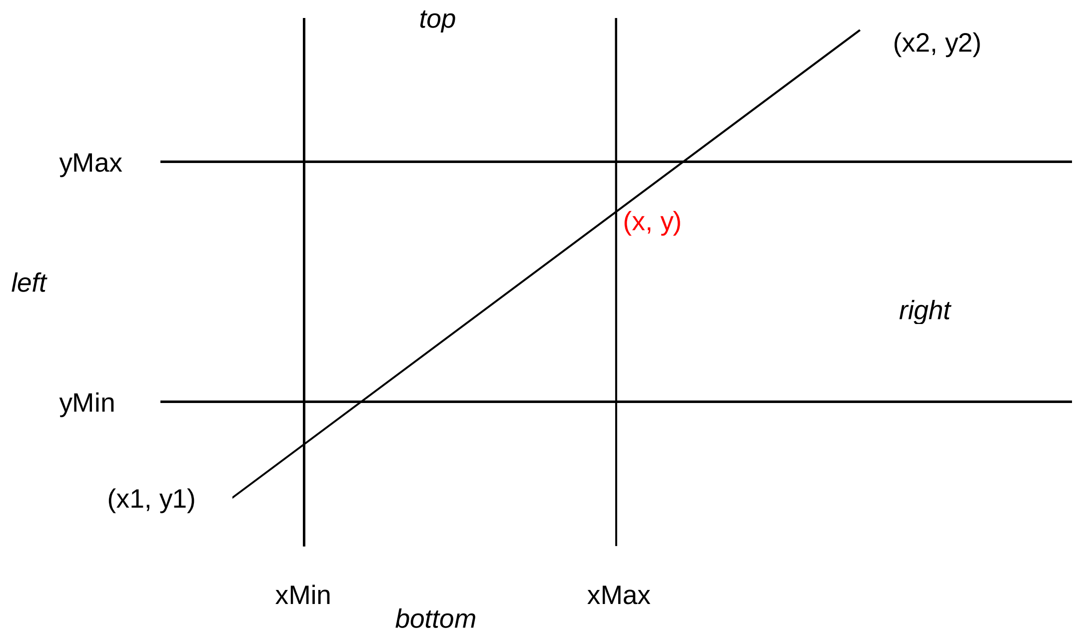
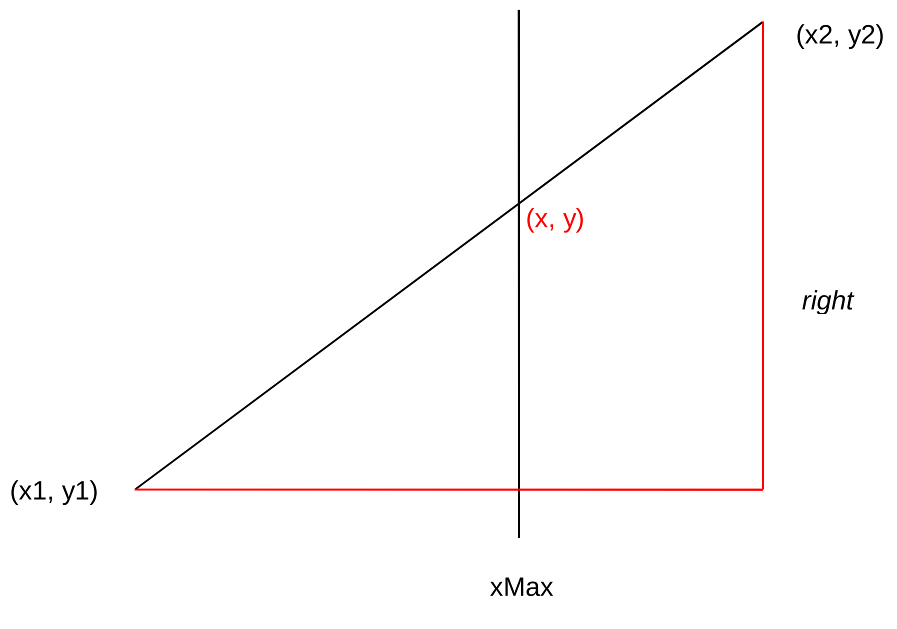



The line from (*x1*, *y1*) to (*x2*, *y2*) in the diagram above passes from left to right through the rectangle (*xMin, yMin*) to (*xMax, yMax*). This is to show how to calculate (*x*, *y*), the point of intersection of the line with the *right* side of the rectangle.

The technique used is that of "*similar* triangles". Note that this is the mathematical meaning of *similar*.

For any two *similar* triangles the *height* divided by the *base* (the *gradient*) is the same.

In this diagram I have stripped away all parts not relevant to this calculation and have added some lines (the red ones):



Clearly $x$ is simply $xMax$.

We have to calculate $y$. Here's how to do it:

The height of the inner triangle is

$y – y1$

The base of the inner triangle is

$xMax – x1$

The height of the outer triangle is

$y2 – y1$

The base of the outer triangle is

$x2 – x1$

So:

$(y – y1) / (xMax – x1) = (y2 – y1) / (x2 – x1)$

But we want to know $y$, so first we multiply both sides of the equation by $(xMax – x1)$:

$(y – y1)= (y2 – y1) * (xMax – x1) / (x2 – x1)$

which gives us $y – y1$.

Then we add $y1$ to each side and we have

$y = (y2 – y1) * (xMax – x1) / (x2 – x1) + y1$

Got it?

If so, now try clipping to one of the other three edges.

The Cohen-Sutherland repeatedly clips until the resulting clipped line lies either completely with the rectangle, in which case that line is rendered, or lies completely outside the rectangle, in which case nothing is rendered.