Midpoint Line Algorithm

In[226]:=

```
MidpointLineAlgorithm[p_] := Module[
    {x, y, dx, dy, d, dD, dU, newPixelVal = {}, sx = 1, sy = 1},
    dx = Abs[p[[2, 1]] - p[[1, 1]]];
    dy = Abs[p[[2, 2]] - p[[1, 2]]];

    If[p[[1, 1]] > p[[2, 1]], sx = -1];
    If[p[[1, 2]] > p[[2, 2]], sy = -1];

    x = p[[1, 1]];
    y = p[[1, 2]];

    AppendTo[newPixelVal, {y, x}];
    If[dx > dy,
        (* |m| < 1 *)
        d = 2 dy - dx;
        dD = 2 dy;
        dU = 2 (dy - dx);

        While[x ≠ p[[2, 1]],
            If[d < 0,
                d += dD; x += sx;
                ,
                d += dU; x += sx; y += sy;
            ];
            AppendTo[newPixelVal, {y, x}];
        ];
        ,
        (* |m| ≥ 1*)
        d = 2 dx - dy;
        dD = 2 dx;
        dU = 2 (dx - dy);
        While[y ≠ p[[2, 2]],
            If[d < 0,
                d += dD; y += sy;
                ,
                d += dU; y += sy; x += sx;
            ];
            AppendTo[newPixelVal, {y, x}];
        ];
    ];
    Return[newPixelVal];
];
```

In[227]:=

```
DrawLine[p_, window_, colorCode_] := Module[{pixel, newWindow = window},
    pixel = MidpointLineAlgorithm[p];
    Do[
        If[1 ≤ pixel⟦i, 1⟧ ≤ Dimensions[newWindow]⟦1⟧ && 1 ≤ pixel⟦i, 2⟧ ≤ Dimensions[
            newWindow⟦pixel⟦i, 1⟧, pixel⟦i, 2⟧⟧ = colorCode
        ],{i, Length[pixel]}
    ];
    Return[newWindow];
];
```

In[228]:=

```
InitWindow[w_, h_] := Module[{},
    Return[Table[{1},{i,1,w},{j,1,h}]];
]
```

In[229]:=

```
window = InitWindow[26,26];
pointList = {{{4,11},{21,24}},{{2,1},{25,24}},{{21,1},{2,20}},{{10,20},{6,1}},
            {{20,1},{12,16}},{{4,4},{14,4}},{{22,18},{22,20}},{{22,6},{8,14}}};
```

In[234]:=

```
window = InitWindow[26,26];
i = 0;
For[i = 1, i ≤ Length[pointList], i++,
    window = DrawLine[pointList⟦i⟧, window, i/8];
];
```

continue on next page

In[237]:=

```
Show[
    Graphics[Raster[window, ColorFunction → Hue], PlotRange→{{0,50},{0,50}}, Frame→Tru
    Table[
        ListPlot[{pointList[[i]] - {0.5, 0.5}, pointList[[i]]-{0.5,0.5}}, Joined→{False, T
        {i, 1, Length[pointList]}
    ],
    PlotRange→All
]
```

Out[237]=