The Broccoli fractal example

```
> u := [1,1];
  v := [2,3];
```

$$u := [1, 1]$$
$$v := [2, 3]$$

```
> alpha := 0.3;
```

$$\alpha := 0.3$$

```
> u+v;
```

$$[3, 4]$$

```
> alpha*u;
```

$$[0.3, 0.3]$$

```
> (u+v)/2;
```

$$\left[\frac{3}{2}, 2\right]$$

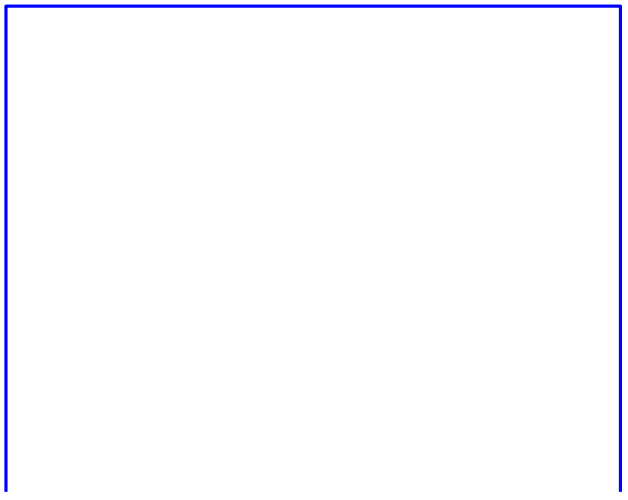
```
> 0.5*(u+v);
```

$$[1.5, 2.0]$$

```
> P1 := plot( sin(x), x=-Pi..Pi );
```

$$P1 := PLOT(...)$$

```
> PLOT( CURVES( [[0,0],[0,1],[2,1],[2,0]], COLOR(RGB,0,0,1)), AXESSTYLE
  (NONE) );
```



```
> PLOT( POINTS( [[0,0],[0,1],[2,1],[2,0]], COLOR(RGB,0,0,0)), AXESSTYLE
  (NONE) );
```

```
> PLOT( POLYGONS( [[0,0],[0,1],[2,1],[2,0]], COLOR(RGB,1,0,1)),
  AXESSTYLE(NONE) );
```

RGB values of 0, 0.6, 0 is dark green

```
> line := proc(a,b) CURVES( [a,b], COLOR(RGB,0,0.6,0) ); end;
```

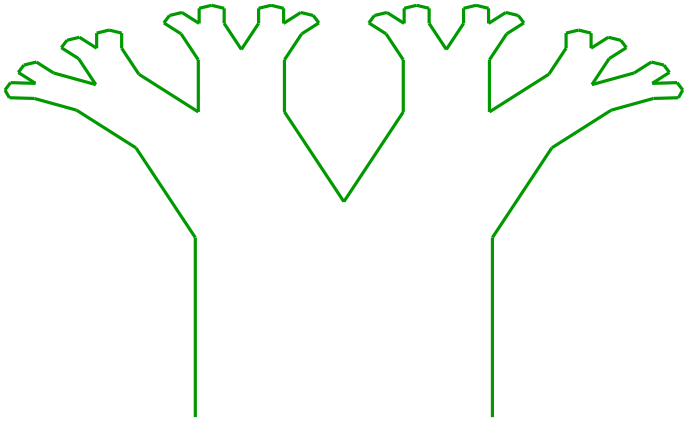
$$line := \mathbf{proc}(a, b)\ \ CURVES([a, b], COLOR(RGB, 0, 0.6, 0))\ \ \mathbf{end\ proc}$$

```
> broc := proc(a,b,n)
  local u,v,p,q,r;
```

```
    if n=0 then return line(a,b); fi;
    u := b-a;
    v := [-u[2],u[1]];
    p := a+v;
    r := b+v;
    q := (p+r)/2.0+alpha*v;
    r := b+v;
    line(a,p), broc(p,q,n-1), broc(q,r,n-1), line(r,b)
  end:
> alpha := 0.2;
```

$$\alpha := 0.2$$

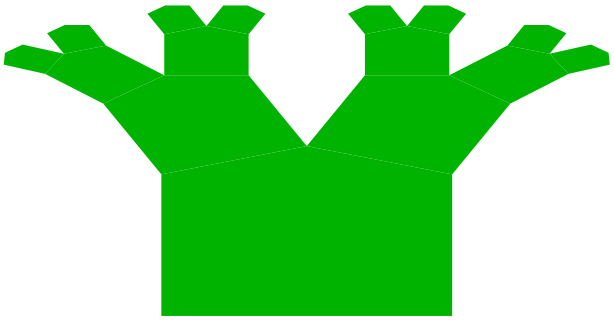
```
> PLOT( broc([0,0],[1,0],5), AXESSTYLE(NONE) );
```



```
> poly := proc(a,p,q,r,b) POLYGONS( [a,p,q,r,b], COLOR(RGB,0,0.7,0),
  STYLE(PATCHNOGRID) ) end;
```

$$poly := \mathbf{proc}(a, p, q, r, b)\ POLYGONS([a, p, q, r, b], COLOR(RGB, 0, 0.7, 0), STYLE(PATCHNOGRID))\ \mathbf{end\ proc}$$

```
> broc := proc(a::[numeric,numeric],b::[numeric,numeric],n::nonnegint)
  local u,v,p,q,r;
    if n=1 then return (); fi;
    u := b-a;
    v := [-u[2],u[1]];
    p := a+v;
    r := b+v;
    q := (p+r)/2.0+alpha*v;
    poly(a,p,q,r,b), broc(p,q,n-1), broc(q,r,n-1);
  end:
> PLOT( broc([0,0],[1,0],5,0.3), AXESSTYLE(NONE) );
```



```
> U := rand(1000..4000);
```

$$U := \mathbf{proc}()\ \mathbf{proc}()\ \mathbf{option}\ \mathit{builtin} = \mathit{RandNumberInterface};\ \mathbf{end\ proc}(6, 3001, 12) + 1000\ \mathbf{end\ proc}$$

```
> U()/10000.0;
```

$$0.3630000000$$

```
> U()/10000.0;
```

$$0.1450000000$$

```
> broc := proc(a::[numeric,numeric],b::[numeric,numeric],n::nonnegint)
  local u,v,p,q,r,alpha;
    if n=1 then return (); fi;
    u := b-a;
    v := [-u[2],u[1]];
    p := a+v;
    r := b+v;
    alpha := U()/10000.0;
    q := (p+r)/2.0+alpha*v;
    poly(a,p,q,r,b), broc(p,q,n-1), broc(q,r,n-1);
  end:
> PLOT( broc([0,0],[1,0],6), AXESSTYLE(NONE) );
```