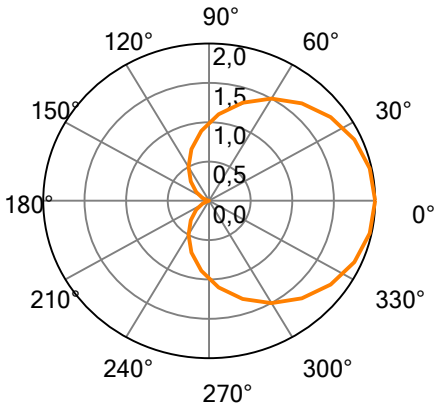
```
circle(clr, r) := ["circle" [0 0 r]^T clr "solid" 1]^T        appVersion(4) = "0.99.7921.69"

grid(r_max, r_tick) :=
    [out clr] := [0 "#FF00FF6D"]
    N := r_max / r_tick
    for n ∈ [0..(N − 1)]
        r1 := r_tick · n
        out_(n+1) := circle("gray", r1)
    for n ∈ [0, 30..330]
        line := ["line" [0 0 r_max·cos(n °) r_max·sin(n °)]^T "gray" "solid" 1]^T
        out := stack(out, [line])
    out := stack(out, [circle("black", r_max)])
    [out]

labels(r_max, r_tick) :=
    r := r_max · 1.2
    N := 12
    out := [r 0 "0°" 9]
    for n ∈ [30, 60..330]
        text := [r·cos(n °) − r·0.05 r·sin(n °) + r·0.05 concat(num2str(n), "°") 9
        out := stack(out, text)
    for n ∈ [0, r_tick..r_max]
        text := [0 n var2str(n, 1) 9]
        out := stack(out, text)
    out
```

```
F1 := | [ out N ] := [ 0 30 ]
      | Δφ := 2·π / N
      | for k ∈ [1..(N+1)]
      |     φ := (k − 1)·Δφ
      |     r := 1 + cos(φ)
      |     out k 1 := r·cos(φ)
      |     out k 2 := r·sin(φ)
      | out
```

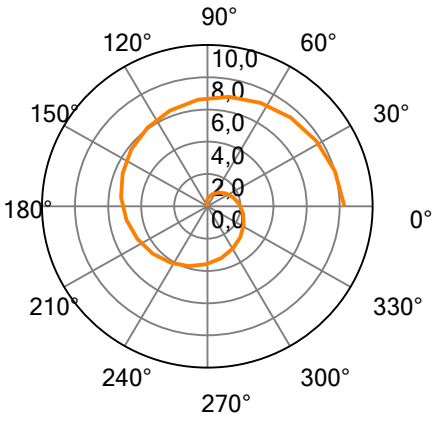
r = 1 + cos(φ)




```
{ grid(2, 0.5)
{ labels(2, 0.5)
{ F1
```

```
F2 := | [ out N ] := [ 0 30 ]
      | Δφ := (2·π + 2) / N
      | for k ∈ [1..(N+1)]
      |     φ := −2·π + (k − 1)·Δφ
      |     r := 2 − φ
      |     out k 1 := r·cos(φ)
      |     out k 2 := r·sin(φ)
      | out
```

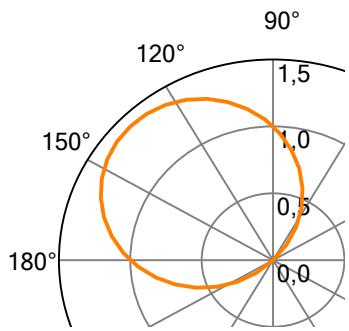
r = 2 - φ




```
{ grid(10, 2)
{ labels(10, 2)
{ F2
```

```
F3 := | [ out N ] := [ 0 30 ]
      | Δφ := 1·π / N
      | for k ∈ [1..(N+1)]
      |     φ := 3·π/4 + (k − 1)·Δφ
      |     r := −cos(φ) + sin(φ)
      |     out k 1 := r·cos(φ)
      |     out k 2 := r·sin(φ)
      | out
```

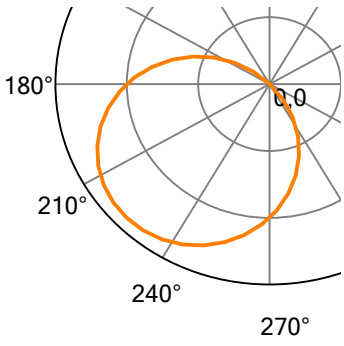
r = - cos(φ) + sin(φ)




```
{ grid(1.5, 0.5)
{ labels(1.5, 0.5)
{ F3
```

```
F4 := | [ out N ] := [ 0 30 ]
      | Δφ := 1·π / N
      | for k ∈ [1..(N+1)]
      |     φ := 5·π/4 + (k − 1)·Δφ
      |     r := −cos(φ) − sin(φ)
      |     out k 1 := r·cos(φ)
      |     out k 2 := r·sin(φ)
      | out
```

r = - cos(φ) - sin(φ)

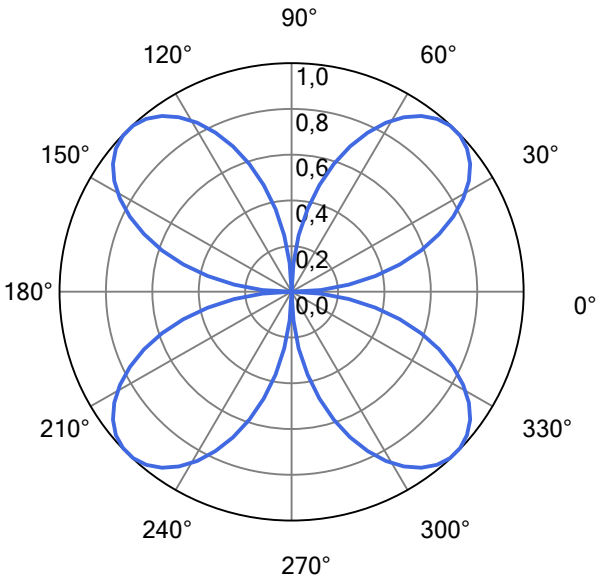



```
{ grid(1.5, 0.5)
{ labels(1.5, 05.)
{ F4
```

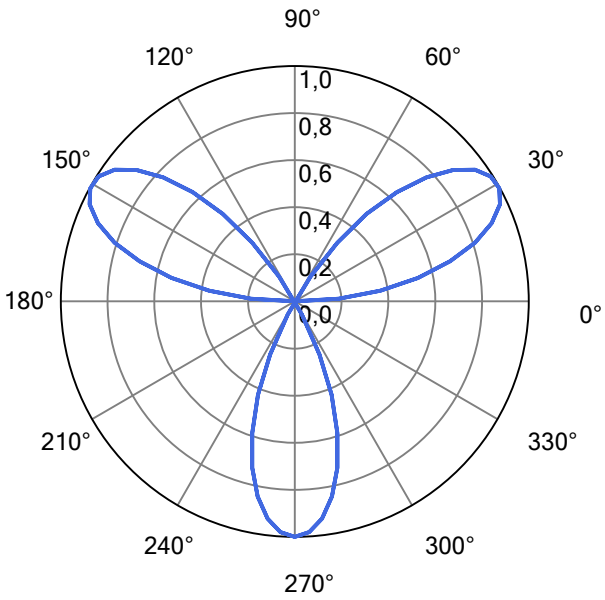
$$F_5 := \left| \begin{array}{l} [\, out \;\; N \,] := [\, 0 \;\; 100 \,] \\ \Delta\varphi := \dfrac{2 \cdot \pi}{N} \\ \text{for} \;\; k \in [\, 1 \,..\, (N+1) \,] \\ \quad \left| \begin{array}{l} \varphi := (k-1) \cdot \Delta\varphi \\ r := \left| \sin(2 \cdot \varphi) \right| \\ out_{k,1} := r \cdot \cos(\varphi) \\ out_{k,2} := r \cdot \sin(\varphi) \end{array} \right. \\ out \end{array} \right.$$

$$F_6 := \left| \begin{array}{l} [\, out \;\; N \,] := [\, 0 \;\; 100 \,] \\ \Delta\varphi := \dfrac{2 \cdot \pi}{N} \\ \text{for} \;\; k \in [\, 1 \,..\, (N+1) \,] \\ \quad \left| \begin{array}{l} \varphi := (k-1) \cdot \Delta\varphi \\ r := \sin(3 \cdot \varphi) \\ out_{k,1} := r \cdot \cos(\varphi) \\ out_{k,2} := r \cdot \sin(\varphi) \end{array} \right. \\ out \end{array} \right.$$

r = | sin(2·φ) |



r = sin(3·φ)



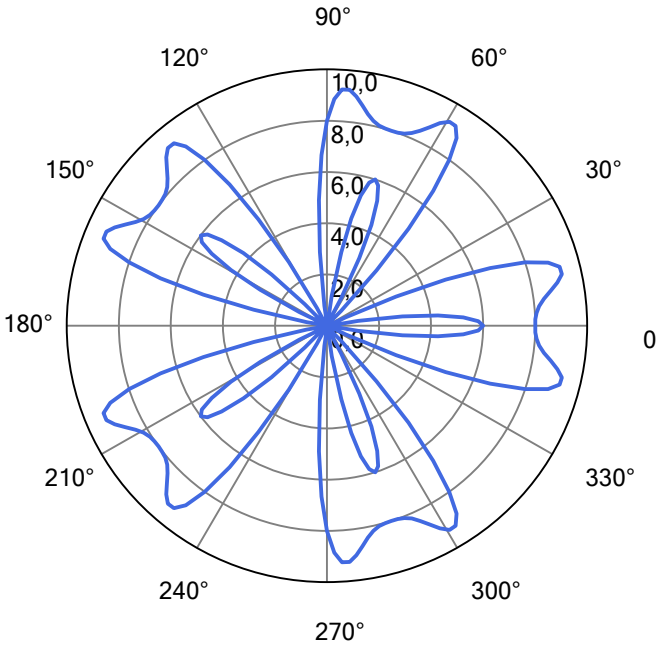
$$\left\{ \begin{array}{l} grid\,(1,\ 0.2) \\ labels\,(1,\ 0.2) \\ F_5 \end{array} \right.$$

$$\left\{ \begin{array}{l} grid\,(1,\ 0.2) \\ labels\,(1,\ 0.2) \\ F_6 \end{array} \right.$$

$$F_7 := \left| \begin{array}{l} [\, out\ N \,] := [\, 0\ 200 \,] \\ \Delta\varphi := \dfrac{2 \cdot \pi}{N} \\ \text{for}\ \ k \in [\, 1\,..\,(N+1) \,] \\ \quad \left| \begin{array}{l} \varphi := (k-1) \cdot \Delta\varphi \\ r := 1 + 7 \cdot \cos(5 \cdot \varphi) \\ r := r + 4 \cdot (\sin(5 \cdot \varphi))^2 + 3 \cdot (\sin(5 \cdot \varphi))^4 \\ out_{k,1} := r \cdot \cos(\varphi) \\ out_{k,2} := r \cdot \sin(\varphi) \end{array} \right. \\ out \end{array} \right.$$

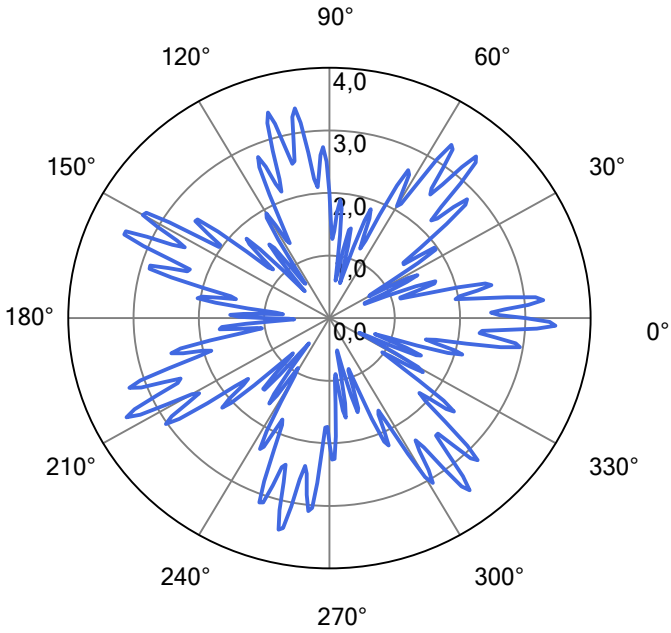
$$F_8 := \left| \begin{array}{l} [\, out\ N \,] := [\, 0\ 360 \,] \\ \Delta\varphi := \dfrac{2 \cdot \pi}{N} \\ \text{for}\ \ k \in [\, 1\,..\,(N+1) \,] \\ \quad \left| \begin{array}{l} \varphi := (k-1) \cdot \Delta\varphi \\ r := 2 - 0.5 \cdot \sin(50 \cdot \varphi) \\ r := r + \cos(7 \cdot \varphi) \\ out_{k,1} := r \cdot \cos(\varphi) \\ out_{k,2} := r \cdot \sin(\varphi) \end{array} \right. \\ out \end{array} \right.$$

r = 1 + 7·cos(5·ϕ) + 4·sin²(5·ϕ) + 3·sin⁴(5·ϕ)



$$\left\{ \begin{array}{l} grid(10, 2) \\ labels(10, 2) \\ F_7 \end{array} \right.$$

r = 2 − ½·sin(50·ϕ) + cos(7·ϕ)



$$\left\{ \begin{array}{l} grid(4, 1) \\ labels(4, 1) \\ F_8 \end{array} \right.$$