

P15. $x(n) = x(n-1)^3 + 2y(n-1)$, $x(0) = 1$

$$y(n) = x(n-1)^2 + 5y(n-1)^2, \quad y(0) = 3$$

$$\Rightarrow x(1) = (1)^3 + 2(3) = 7$$

$$y(1) = (1)^2 + 5(3)^2 = 146$$

$$\Rightarrow x(2) = 7^3 + 2(146) = 435$$

$$y(2) = 7^2 + 5(146)^2 = 10629$$

$$\Rightarrow x(3) = 435^3 + 2(10629) = 82334133$$

$$y(3) = 435^2 + 5(10629)^2 = 565067430$$

$$[1, 3], [7, 146], [435, 10629], [82334133, 565067430]$$

$$\text{Orb}([x^3 + 2y, x^2 + 5y^2], [x, y], [1, 3], [0, 3])$$

P16. $x(n) = \frac{2 + x(n-1) + y(n-1)}{2 + 2x(n-1) + 2y(n-1)}$

$$y(n) = \frac{2 + x(n-1) + y(n-1)}{1 + 2x(n-1) + 2y(n-1)}$$

$$\Rightarrow F := \left[\frac{(2+x+y)}{2+2x+2y}, \frac{(2+x+y)}{1+2x+2y} \right]$$

$$\Rightarrow \text{SFP SEP}(F, [x, y])$$

$$\Rightarrow [0.6953496364, 0.8641637014]$$

$$P14 \quad x'(t) = 2x(t)(1-x(t))(2-x(t))(3-x(t))$$

$$\Rightarrow f(x) = 2x(1-x)(2-x)(3-x) = 0$$

$$\Rightarrow x = 0, 1, 2, 3$$

$$\text{ii) } f(x) = (2x - 2x^2)(2-x)(3-x)$$

$$\Rightarrow f(x) = (2x - 2x^2)(6 - 5x + x^2)$$

$$\Rightarrow f(x) = -2x^4 + 12x^3 - 22x^2 + 12x$$

$$\Rightarrow f'(x) = -8x^3 + 36x^2 - 44x + 12$$

$$\Rightarrow f'(0) = 12$$

$$f(3) = -12$$

$$f'(1) = -8 + 36 - 44 + 12 = -4 \quad 1 \text{ and } 3 \text{ are stable}$$

$$f'(2) = 4$$