P14) i)

$$x'(t) = 2x(t)(1-x(t))(2-x(t))(3-x(t))$$
$$f(x) = 2x(1-x)(2-x)(3-x)$$
$$0 = 2x(1-x)(2-x)(3-x)$$
$$x=0, \; x=1, \; x=2, \; x=3 \;\rightarrow \; eq \; sol$$

ii)   Maple bxt

iii) $f(x) = 2x(1-x)(2-x)(3-x)$

$f'(x) = 2(-4x^3 + 18x^2 - 22x + 6)$

$f'(0) = 2(0 + 0 - 0 + 6)$

Since $f'(0)$ is not negative then this is not stable

$f'(1) = 2(-4 + 18 - 22 + 6)$

$\quad = 2(20 - 22)$

$\quad = 2(-2) = -4$

Since $f'(1)$ is negative then it is stable

$f'(2) = 2(-4(8) + 18(4) - 22(2) + 6)$

$\quad = 2(-32 + 72 - 44 + 6)$

$\quad = 2(2) = 4$

Since $f'(2)$ is not negative, it is not stable

$f'(3) = 2(-4(27) + 18(9) - 22(3) + 6)$

$\quad = 2(-108 + 162 - 66 + 6)$

$\quad = 2(-6) = -12$

Since this is negative ~~then~~ it is stable

thus $x = 1$ is stable and $x = 3$ is stable

P15) $x(n) = x(n-1)^3 + 2y(n-1)$, $y(n) = x(n-1)^2 + 5y(n-1)^2$

$x(0) = 1$ $y(0) = 3$

$x(1) = x(0)^3 + 2y(0)$, $y(1) = x(0)^2 + 5y(0)^2$

$x(1) = 1^3 + 2(3)$, $y(1) = 1^2 + 5(3)^2$

$x(1) = 7$, $y(1) = 46$

$x(2) = x(1)^3 + 2y(1)$, $y(2) = x(1)^2 + 5y(1)^2$

$x(2) = 7^3 + 2(46)$, $y(2) = 7^2 + 5(46)^2$

$x(2) = 435$, $y(2) = 10\,629$

$x(3) = x(2)^3 + 2y(2)$, $y(3) = x(2)^2 + 5y(2)^2$

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

$x(3) = 82334133$, $y(3) = 565\,067\,430$

so, $[[1,3],[7,46],[435, 10629],[82334133, 565067430]]$

P16)

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

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

$$(x,y) = \left(\frac{2 + x + y}{2 + 2x + 2y} , \frac{2 + x + y}{1 + 2x + 2y} \right)$$

SEE Maple txt

P17)   Maple txt