

OK to post

Anne Somalwar, 12/6/2021, hw26

P14)

$$(i) \quad 2x(1-x)(2-x)(3-x) = 0$$

$$\boxed{x = 0, 1, 2, 3}$$

(ii) See Maple Code

$$(iii) \quad F(x) = 2x(1-x)(2-x)(3-x)$$

$$= (2x - 2x^2)(2-x)(3-x)$$

$$= (4x - 2x^2 - 4x^2 + 2x^3)(3-x)$$

$$= (2x^3 - 6x^2 + 4x)(3-x)$$

$$= 6x^3 - 2x^4 - 18x^2 + 6x^3 + 12x - 4x^2$$

$$= -2x^4 + 12x^3 - 22x^2 + 12x$$

$$F'(x) = -8x^3 + 36x^2 - 44x + 12$$

$$F'(0) = 12 \geq 0, \text{ so } 0 \text{ is unstable}$$

$$F'(1) = -8 + 36 - 44 + 12 = -4 < 0, \text{ so}$$

1 is stable

$$F'(2) = -8(8) + 36(4) - 88 + 12 = 4 \geq 0$$

so 2 is unstable

$$F'(3) = -8(27) + 36(9) - 44(3) + 12$$

$$= -12 < 0, \text{ so } 3 \text{ is stable.}$$

$$\text{P15) } x(0)=1, y(0)=3$$

$$x(1) = x(0)^3 + 2y(0) = 1 + 6 = 7$$

$$y(1) = x(0)^2 + 5y(0)^2 = 1 + 45 = 46$$

$$x(2) = x(1)^3 + 2y(1) = 343 + 92 = 435$$

$$y(2) = x(1)^2 + 5y(1)^2 = 49 + 10580$$

$$= 10629$$

$$x(3) = x(2)^3 + 2y(2) = 82339133$$

$$y(3) = x(2)^2 + 5y(2)^2 = 189225 + 564878205$$

$$= 565067430$$

P16) See Maple Code

P17) See Maple Code