#4 Theorem $f(b) - f(a) = (b-a)f'(c)$

$f:[a,b] \to \mathbb{R}$

for $f: [a,b] \to \mathbb{R}^2$

$f: [0,1] \to \mathbb{R}^2$

$f(x) = (f_1(x), f_2(x)) = (x(1-x), x^2(1-x))$

$f_1: [0,1] \to \mathbb{R}$ $\quad f_1(x) = x(1-x) = x - x^2$ continuous & differentiable

$f_2: [0,1] \to \mathbb{R}$ $\quad f_2(x) = x^2(1-x) = x^2 - x^3$ continous & differentiable

$f = (f_1, f_2) \Rightarrow$ continous $[0,1]$

differentiable $(0,1)$

$f(1) - f(0) =$

$(1(1-1), 1^2(1-1)) - (0(1-0), 0^2(1-0)) = (0,0) - (0,0) = (0,0)$

$f(x) = (x(1-x), x^2(1-x)) = (x-x^2, x^2-x^3)$

$f'(x) = (1-2x, 2x-3x^2)$

$\Rightarrow$ yes the theorem remains true for $f: [a,b] \to \mathbb{R}^2$