Envelope Theorem (one choice variable and one constraint)

Let F and G be econtinuously differentiable functions of x and θ. For any given θ, let $x^*(\theta)$ maximize $F(x, \theta)$ subject to $c \geq G(x, \theta)$, and let $\lambda^*(\theta)$ be the associated value of the Lagrange multipliesr. Suppose that $x^*(\theta)$ and $\lambda^*(\theta)$ are also continuously differentiable functions, and that the constraint qualification $G_1(x^*(\theta), \theta) \neq 0$ holds for all values of θ. Then, the maximum value function defined by

$$V(\theta) = \max_x F(x, \theta) \text{ subject to } c \geq G(x, \theta)$$

satisfies

$$V'(\theta) = F_2(x^*(\theta), \theta) - \lambda^*(\theta) G_2(x^*(\theta), \theta).$$