Date 23 09 2013

Cálculo II-A

Lista 1

Exercício 13

$$f(x) = \int_{-\operatorname{sen}^2 x}^{x^4} \cos(t^3)\,dt = \int_{-\operatorname{sen}^2 x}^{a} \cos(t^3)\,dt + \int_{a}^{x^4} \cos(t^3)\,dt$$

$$= -\int_{a}^{-\operatorname{sen}^2 x} \cos(t^3)\,dt + \int_{a}^{x^4} \cos(t^3)\,dt$$

$$= -F(g(x)) + F(h(x))$$

onde $F(y) = \int_a^y \cos(t^3)\,dt$, $g(x) = -\operatorname{sen}^2 x$ e $h(x) = x^4$.

Como $f(x) = -F(g(x)) + F(h(x))$, pela regra da cadeia, temos que

$$f'(x) = -F'(g(x)) \cdot g'(x) + F'(h(x)) \cdot h'(x)$$

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Exercício 13

$$F'(y) = \frac{d}{dy}\left[\int_a^y \cos(t^3)\,dt\right] \underset{\downarrow}{=} \cos(y^3)$$

$2^{\underline{o}}$ T.F.C.

$$g'(x) = -2\,\operatorname{sen} x \cos x = -\operatorname{sen}(2x)$$

$$h'(x) = 4x^3$$

Portanto;

$$f'(x) = -F'(g(x))\cdot g'(x) + F'(h(x))\cdot h'(x) =$$

$$= -\cos\left((-\operatorname{sen}^2 x)^3\right)\cdot(-\operatorname{sen}(2x)) + \cos\left((x^4)^3\right)\cdot 4x^3$$

$$= +\cos(-\operatorname{sen}^6 x)\cdot \operatorname{sen}(2x) + \cos(x^{12})\cdot 4x^3$$

$$= \cos(\operatorname{sen}^6 x)\operatorname{sen} 2x + 4x^3\cdot\cos(x^{12})$$

$\cos(-x) = \cos(x)$, $\forall x$