

MAT0103 — Lista 5

1.
 - (a) $f'(1) = 6$
 - (b) $f'(1) = 5$
 - (c) $f'(1) = 5$
 - (d) $f'(1) = \frac{7}{2}$
 - (e) $f'(1) = -6$
 - (f) $f'(1) = 1$
 - (g) $f'(1) = 2$
 - (h) $f'(1) = \frac{5}{2}$
 - (i) $f'(1) = -1$
 - (j) $f'(1) = \frac{37}{2}$
2.
 - (a) $\cos(a)$
 - (b) $-\sin(a)$
 - (c) $\sec^2(a)$
 - (d) $\csc^2(a)$
3.
 - (a) $f'(x) = 6x - 5$.
 - (b) $f'(x) = 4x^3 - x^2 + 5x - 0.3$.
 - (c) $f'(x) = ax + b$.
 - (d) $f'(x) = \frac{1}{3}x^{-2/3}$.
 - (e) $f'(x) = \frac{5}{2}x^{3/2} - 1 + \frac{1}{2}x^{-1/2}$.
 - (f) $f'(x) = (x+1)^2 + 2(x-1)(x+1) = (3x-1)(x+1)$.
 - (g) $f'(x) = -6(a-x)$
 - (h) $f'(x) = \frac{ax^2 - c}{(a+b)x^2}$
 - (i) $f'(x) = 4x^3 - 3x^2 - 8x + 9$
 - (j) $f'(x) = 6x^5 - 15x^4 + 12x^3 - 9x^2 + 2x + 3$
 - (k) $f'(x) = -\frac{1}{2}x^{-3/2} - \frac{1}{2}x^{-1/2}$
 - (l) $f'(x) = \frac{1}{3}x^{-2/3} + 4x^{1/3} + 2 + \frac{10}{3}x^{2/3} + 12x$
 - (m) $f'(x) = \frac{1}{3}x^{-2/3} + 4x^{1/3} + 2 + \frac{10}{3}x^{2/3} + 12x$
 - (n) $f'(x) = 6x^5 - 56x^3 + 98x$

$$(o) \quad f'(x) = \frac{\sqrt{3}(\sqrt{x}+1)(\sqrt{2x}+1)}{2\sqrt{x}} + \frac{(\sqrt{3x}+1)(\sqrt{2x}+1)}{2\sqrt{x}} + \frac{(\sqrt{x}+1)(\sqrt{3x}+1)}{\sqrt{2x}}$$

4.

$$f(a) = 3a - 2\sqrt{a}$$

$$f'(a) = 3 - \frac{1}{\sqrt{a}}$$

$$f(1) = 1$$

$$f'(1) = 2$$

$$f(4) = 8$$

$$f'(4) = \frac{5}{2}$$

5.

$$f'(x) = -5 + 6x^2 - x^4$$

$$f'(-x) = -5 + 5(-x)^2 - (-x)^4 = -5 + 5x^2 - x^4 = f'(x)$$

$$6. \quad (a) \quad f'(x) = \frac{-2}{(x-1)^2}$$

$$(b) \quad f'(x) = \frac{1-x^2}{1+x^2}$$

$$(c) \quad f'(t) = \frac{3t^2 - 6t - 1}{(t-1)^2}$$

$$(d) \quad f'(v) = \frac{v^4 + 2v^3 + 5v^2 - 2}{(v^2 + v + 1)^2}$$

$$(e) \quad f'(x) = \frac{ad - bc}{(cx + d)^2}$$

$$(f) \quad f'(x) = \frac{-9x^6 + 6x^5 + 21x^4 - 12x^3 - 15x^2 + 2x + 3}{3(x^2 - 1)^2}$$

$$(g) \quad f'(x) = -\frac{6x^2}{(x^3 + 1)^2}$$

$$(h) \quad f'(x) = -\frac{6x^2}{(x^3 - 1)^2}$$

$$(i) \quad f'(x) = -\frac{3x^2}{\sqrt{\pi}}$$

$$(j) \quad f'(t) = -\frac{2t + 1}{(t^2 + t + 1)^2}$$

$$(k) \quad f'(t) = -\frac{2t - 3}{(t^2 - 3t + 6)^2}$$

$$(l) \quad f'(x) = -\frac{4(x^5 - 2b^2x^3)}{(b^2 - x^2)^2}$$

$$(m) \quad f'(x) = \frac{-x^4 - 2x^3 + 3x^2 + 2x + 1}{(x^3 + 1)^2}$$

$$(n) \quad f'(x) = \frac{6x(-5x^3 + 3x + 1)}{(1 - x^2)^2(1 - 2x^3)^2}$$

$$7. \quad (a) \quad f'(x) = \cos(x) - \sin(x)$$

$$(b) \quad f'(x) = \frac{1}{1 - \cos(x)} - \frac{x \sin(x)}{(1 - \cos(x))^2}$$

$$(c) \quad f'(x) = \frac{x \sec^2(x) - \tan(x)}{x^2}$$

$$(d) \quad f'(x) = x \cos(x)$$

$$(e) \quad f'(x) = -\frac{\sin(x)}{x^2} + \frac{\cos(x)}{x} + \csc(x) - x \cot(x) \csc(x)$$

$$(f) \quad f'(t) = \frac{\cos(t)}{t + \cos(t)} - \frac{(1 - \sin(t)) \sin(t)}{(t + \cos(t))^2}$$

$$(g) \quad f'(x) = \frac{x \sin(x) + \sin(x) - x \cos(x) + \cos(x)}{(\sin(x) + \cos(x))^2}$$

$$(h) \quad f'(x) = \frac{\sin(x) + x \cos(x)}{\tan(x) + 1} - \frac{x \tan(x) \sec(x)}{(\tan(x) + 1)^2}$$

$$(i) \quad f'(x) = -2 \cos(x) \sin(x) = -\sin(2x)$$

$$(j) \quad f'(x) = \frac{2}{(\sin(x) + \cos(x))^2}$$