$$\sqrt{y}\cdot(y-1)$$

$$y^{1/2}(y-1)$$

$$y^{3/2}-y^{1/2}$$

$$\Rightarrow \frac{3}{2}y^{1/2}-\frac{1}{2}y^{-1/2}$$

$$\frac{3}{2}\sqrt{y}-\frac{1}{2\sqrt{y}}=\frac{6y-2}{4\sqrt{y}}=\frac{3y-1}{2\sqrt{y}}$$

$\cos u$

$-\operatorname{sen} u \cdot u'$

$\operatorname{sen} u$

$\cos u \cdot u'$

$\cos\sqrt{1-x^2}$

$$\sqrt{1-x^2}$$

$$\cos\,(1-x^2)^{1/2} \cdot$$

$$\frac{1}{\cancel{2}}(1-x^2)^{-1/2} \cdot -\cancel{2}x$$

$$-x(1-x^2)^{-1/2} \Rightarrow \frac{-x}{\sqrt{1-x^2}} = \frac{x}{\sqrt{1-x^2}}\,\mathrm{sen}\sqrt{1-x^2}$$

$$= -\,\mathrm{sen}\sqrt{1-x^2} \cdot \frac{-x}{\sqrt{1-x^2}}$$

$$y = \frac{\overbrace{\ln(2x)}^{u}}{\underbrace{\cos(5x)}_{v}} \Rightarrow \frac{\frac{\cancel{2}}{\cancel{2}x} \cdot \cos(5x) - \ln(2x) \cdot -\operatorname{sen}(5x) \cdot 5}{\cos^2(5x)}$$

$$= \frac{\frac{\cos(5x)}{x} + \frac{5\ln(2x)\operatorname{sen}(5x)}{1}}{\cos^2(5x)}$$

$$\frac{u'v - uv'}{v^2}$$

$$= \frac{\frac{\cos(5x) + 5x\ln(2x)\operatorname{sen}(5x)}{x}}{\frac{\cos^2(5x)}{1}} = \frac{\cos(5x) + 5x\ln(2x)\operatorname{sen}5x}{x} \cdot \frac{1}{\cos^2(5x)}$$

$$\ln u = \frac{u'}{u}$$

$$-\operatorname{sen} u \cdot u$$

8) $f(x) = \frac{2}{3}(5x-3)^{-1} \cdot (5x+3)$

$f(x) = \frac{2(5x+3)}{3(5x-3)}$

$f(x) = \frac{(10x+6)}{(15x-9)} =$

$f'(x) = \frac{10(15x-9) - (10x+6) \cdot 15}{(15x-9)^2}$

$f'(x) = \frac{\cancel{150x} - 90 - \cancel{150x} - 90}{(15x-9)^2}$

$f'(x) = \frac{-180}{(15x-9)^2}$

Regra de L'Hospital

- Resolvendo limites indeterminados por derivadas

$$\frac{f'(x)}{\quad} \quad e \quad \frac{g'(x)}{\quad}$$

Ex:

a) $$\lim_{x \to 2} \frac{\overbrace{x^2 + x - 6}^{f(x)}}{\underbrace{x^2 - 3x + 2}_{g(x)}} = \frac{0}{0}$$

$f(x) = x^2 + x - 6$

$f'(x) = 2x + 1$

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

$g'(x) = 2x - 3$

$$\lim_{x \to 2} \frac{2x + 1}{2x - 3} = \frac{5}{1} = 5$$

Derivação Implícita

- Derivar ambos os lados da equação implicitando y em relação às variáveis da equação.

- Deriva-se todas as variáveis da equação

Ex:

a) $x^2 + y^2 = 4$

$2x + 2yy' = 0$

$2yy' = -2x$

$y' = \frac{-\cancel{2}x}{\cancel{2}y}$

$y' = \frac{-x}{y}$

Regra Produto

b) $x.y^2 + 2y^3 = x - 2y$

$1y^2 + x2y.y' + 6y^2y' = 1 - 2y'$

$y^2 + 2xyy' + 6y^2y' = 1 - 2y'$

$2xyy' + 6y^2y' + 2y' = 1 - y^2$

$y'(2xy + 6y^2 + 2) = 1 - y^2$

$\rightarrow y' = \frac{1 - y^2}{2xy + 6y^2 + 2}$

c) $x^2 y^2 + x \cdot \text{sen}\, y = 0$

$$2x\,y^2 + x^2 \cdot 2y\,y' + 1\,\text{sen}\, y + x \cos y \cdot y' = 0$$

$$2xy^2 + 2x^2 y\,y' + \text{sen}\, y + x \cos y \cdot y' = 0$$

$$2x^2 y\,y' + x \cos y\, y' = -2xy^2 - \text{sen}\, y$$

$$y'(2x^2 y + x \cos y) = -2xy^2 - \text{sen}\, y$$

$$y' = \frac{-2xy^2 - \text{sen}\, y}{2x^2 y + x \cos y}$$

Digitalizado com CamSc

Calcular y' das equações $y' = \frac{dy}{dx}$

a) $x^3 + y^3 = a^3$

$$3x^2 + 3y^2y' = 0$$

$$3y^2y' = -3x^2$$

$$y' = \frac{-\cancel{3}x^2}{\cancel{3}y^2}$$

$$y' = \frac{-x^2}{y^2}$$

b) $x^3 + x^2y + y^2 = 0$

$$3x^2 + 2xy + x^2y' + 2yy' = 0$$

$$x^2y' + 2yy' = -3x^2 - 2xy$$

$$y'(x^2 + 2y) = -3x^2 - 2xy$$

$$y' = \frac{-3x^2 - 2xy}{x^2 + 2y}$$

c) $\sqrt{x} + \sqrt{y} = \sqrt{a}$

$$x^{1/2} + y^{1/2} = a^{1/2}$$

$$\frac{1}{2}x^{-1/2} + \frac{1}{2}y^{-1/2}y' = 0$$

$$\frac{1}{2\sqrt{y}}y' = -\frac{1}{2\sqrt{x}}$$

$$y' = \frac{-\cancel{2}\sqrt{y}}{\cancel{2}\sqrt{x}}$$

$$\Rightarrow y' = -\frac{\sqrt{y}}{\sqrt{x}}$$

$$y' = -\sqrt{\frac{y}{x}}$$