$2(s+4) + (2s-1) = 4s + 7$

$$\frac{1(x-5) - 1\cdot(x+7)}{(x-5)^2} \qquad \frac{-12}{(x-5)^2}$$

composed with

$$\cos(x) \circ x^3 = \cos(x^3)$$

$$\frac{d}{dx} f(g(x)) = f'(g(x)) \cdot g'(x)$$

$f(x) = \cos x \quad g(x) = x^3$

$$\to -\sin(x^3) \cdot 3x^2$$

$$\cos(2x^2)$$

$f(x) = \cos(x) \qquad g(x) = 2x^2$

$$f'(g(x))g'(x)$$

$$-\sin(2x^2)4x$$

$$e^{\ln(x)} = x \qquad f(x) = e^x \quad g(x) = \ln(x)$$

$$f'(g(x))g'(x)$$

$$e^{\ln(x)} \frac{1}{x} \qquad \frac{x}{x} = 1$$

$\ln(\ln x)$ $\quad f(x) = \ln(x)$

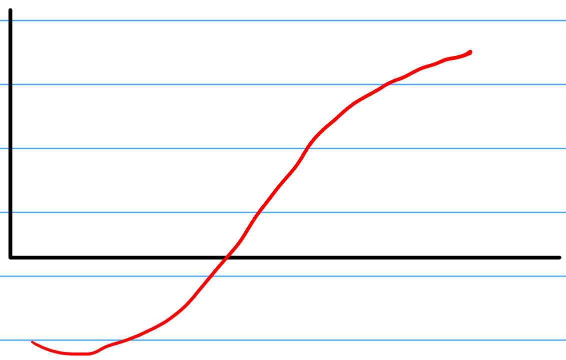
$g(x) = \ln(x)$

$f'(g(x))\,g'(x)$

$\frac{1}{\ln(x)} \cdot \frac{1}{x} = \frac{1}{x\ln(x)}$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$\sqrt{x} - 2$



$$\frac{d}{dx} e^x = e^x$$

$$\frac{d}{dx} 2^x = \frac{d}{dx}\left(e^{\ln(2)}\right)^x = \frac{d}{dx} e^{\ln(2)\cdot x}$$

$f(x) = e^x \qquad g(x) = \ln(2)\cdot x$

$$e^{\ln(2)\cdot x} \cdot \ln(2) = \ln(2)\cdot 2^x$$

$$\frac{d}{dx} a^x = \ln(a) \cdot a^x$$

$$e^{ix} = \cos(x) + i\sin(x)$$

$i e^{ix}$

$-1 \quad e^{ix}$

$-i \quad e^{ix}$

e^{ix}

$$e^{i\pi} + 1 = 0$$

$$\frac{d}{dx} 2^{x^3+3x}$$

outer 2^x

inner x^3+3x

$f'(g(x))g'(x)$

$$\left(\ln(2)\, 2^{x^3+3x}\right) \cdot (3x^2+3)$$

$$\frac{d}{dx} \ln(\sin(x^4))$$

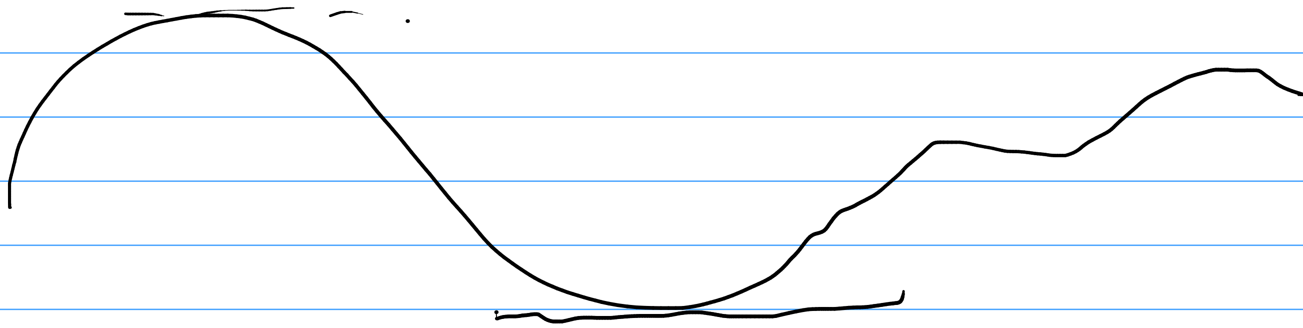
outer $\ln(x)$

inner $\sin(x^4)$

$$\frac{1}{\sin(x^4)} \cdot \frac{d}{dx} \sin(x^4)$$

$\cos(x^4)\, 4x^3$

$$\frac{\cos(x^4) \cdot 4x^3}{\sin(x^4)}$$



100ft of fence
max. area of a rectangle

x = length
y = width

$2x + 2y = 100$

max. $x \cdot y$

$x + y = 50$
$x = 50 - y$

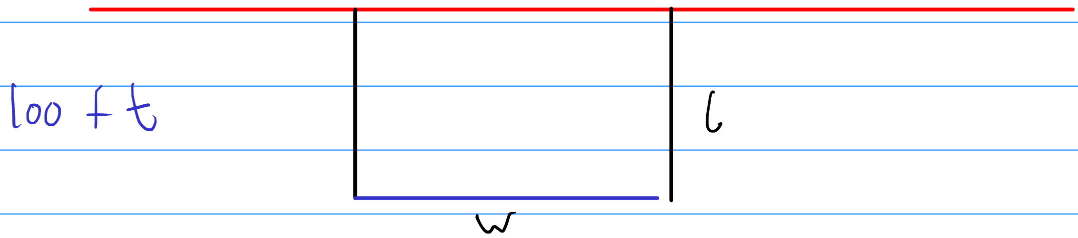
area = $(50-y)(y)$ $a(y) = 50y - y^2$

$a'(y) = 50 - 2y$

$50 - 2y = 0$

$y = 25$

625 ft^2



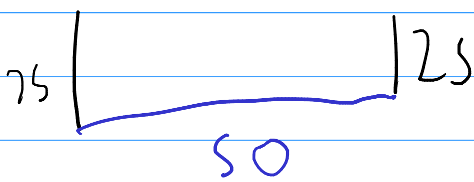
$2L + w = 100$ $\qquad$ $w = 100 - 2L$

$a = L \cdot w$ $\qquad$ $a = L(100 - 2L)$

$a(L) = 100L - 2L^2$

$a'(L) = 100 - 4L$

$100 - 4L = 0 \quad L = 25$



$= 1250 \text{ ft}^2$

$$\lim_{x \to k} f(x) \qquad \frac{0}{0} \qquad 0^{\infty}$$

$$\lim_{x \to 1} \frac{x^2 - 1}{x - 1} \qquad \frac{(x+1)\cancel{(x-1)}}{\cancel{(x-1)}} \qquad \frac{0}{0}$$

$$\lim_{x \to 1} (x+1) = 2$$

l'hospital's rule

$$\lim_{x \to 1} \frac{2x}{1} = 2$$