11. $f(x) = 7x^2 - 5x + 7$

$f'(x) = 2 \cdot 7x \quad -5 + 0$

$= 14x - 5$

15. $f(r) = 6e^r$ $\quad f'(r) = 6e^r$

19. $h(t) = e^t - \sin t - \cos t$

$e^t - \cos t + \sin t$

25. $f(x) = (2 - 3x)^2$

$f(x) = 4 - 12x + 9x^2$

$-12 + 18x$

8. $g(x) = 2x^2(5x^3)$ $\quad 10x^5 \to 50x^4$

$f(x) = 2x^2$
$g(x) = 5x^3$

$2x^2 \cdot 15x^2 + 5x^3 \cdot 4x$

$30x^4 + 20x^4$

$50x^4$

20. $g(t) = \dfrac{t^5}{\cos t - 2t^2}$

$$\frac{(\cos t - 2t^2)\,5t^4 - t^5(-\sin t - 4t)}{\cos^2 t - 4t^2 \cos t + 4t^4}$$

$$y' = f'(g(x)) \cdot g'(x).$$

$\sin(x^2)$ $\quad\quad$ $\cos(x^2) \cdot 2x$

$e^{\cos x}$ $\quad\quad$ $e^{\cos x}(-\sin x)$

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

$y = \ln(x^4)$

$y = \ln(u)$

$u = x^4$

$y' = \frac{1}{u} \cdot u'$

$u' = 4x^3$

$y' = \frac{1}{x^4} \cdot 4x^3$

$(1-x)^2$ $\quad$ $(1-x)^3$ $\quad$ $(1-x)^4$

$f=x^2$ $\quad$ $f=x^3$ $\quad$ $f=x^4$

$g=1-x$ $\quad$ $g=1-x$ $\quad$ $g=1-x$

$f'=4x^3$

$f'(g(x))\cdot g'(x)$ $\quad$ $3(1-x)^2\cdot -1$ $\quad$ $4(1-x)^3\cdot -1$

$2(1-x)\cdot -1$ $\quad$ $-3(1-x)^2$

$-2(1-x)$

$-2\ \cancel{+2x}$

$2x-2$

$\frac{\sin x}{\cos x}$ $\quad$ $\sec^2 x$

$\sin x\cdot\frac{1}{\cos x}$ $\quad$ $\frac{\cos x}{\cos x}$

$\sin x\cdot(\cos x)^{-1}$

$\sin x\cdot\left(-(\cos x)^{-2}\cdot(-\sin x)\right)+\cos x\cdot(\cos x)^{-1}$

$\frac{-\sin^2 x}{-\cos^2 x}$ $\quad$ $+1$

$\tan^2 x+1$

$$\left(\sin(e^x)\right)^2$$

$f = x^2$ $\quad f' = 2x$ $\quad f(g(h(x)))$

$g = \sin x$ $\quad g' = \cos x$

$h = e^x$ $\quad h' = e^x$ $\quad f'(g(h(x))) \cdot \frac{d}{dx}[g(h(x))]$

$$f'(g(h(x))) \cdot g'(h(x)) \cdot h'(x)$$

$$2(\sin(e^x)) \cdot \cos(e^x) e^x$$

10. $h(t) = e^{3t^2+t-1}$

$f = e^x$ $\quad f' \; e^x$

$g = 3t^2+t-1$ $\quad g' = 6t+1$

$$\underbrace{e^{3t^2+t-1}}_{f'(g(x))} \cdot \underbrace{(6t+1)}_{g'(x)}$$

$\ln(-3\cos(5x+1))$ $\qquad f \circ g \quad f \circ g$

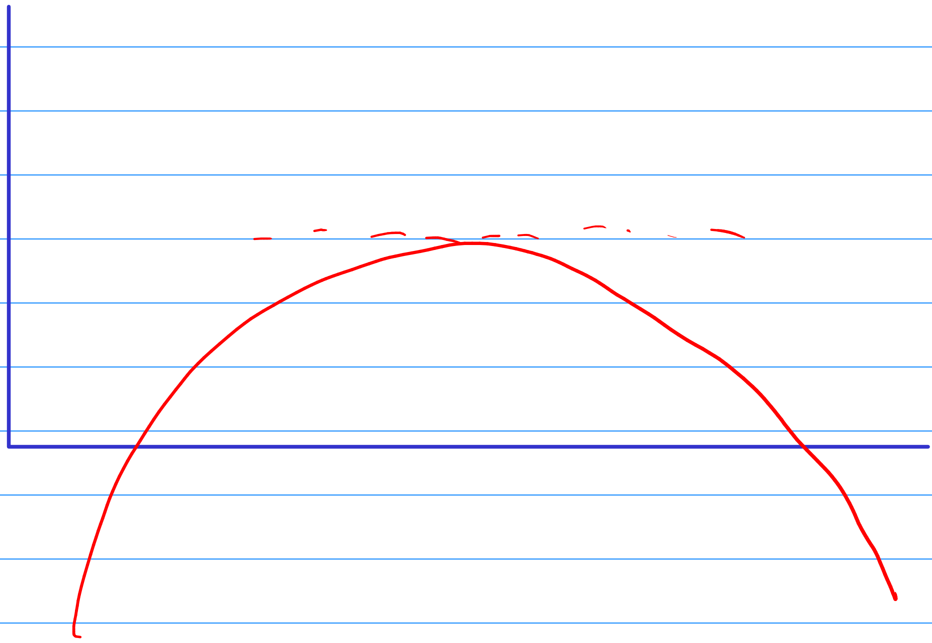
$f = \ln x$ $\quad f' = \frac{1}{x}$

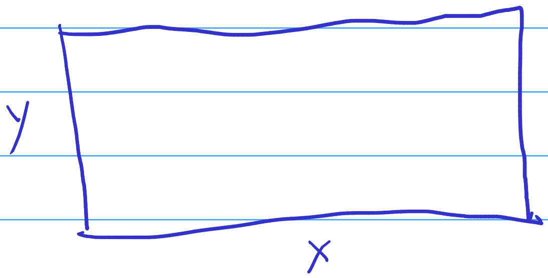
$g = -3\cos x$ $\quad g' = 3\sin x$

$h = 5x+1$ $\quad h' = 5$

$$\underbrace{\frac{1}{-3\cos(5x+1)}}_{f'(g(h(x)))} \cdot \underbrace{3\sin(5x+1)}_{g'(h(x))} \cdot \underbrace{5}_{h'(x)}$$

$$\frac{8 \sin(5x+1) \cdot 5}{-8 \cos(5x+1)} \qquad -5 \tan(5x+1)$$





Perimeter $= 2x+2y$
area $= xy$

100ft

$A = x(50-x)$

$A = 50x - x^2$

$A' = 50 - 2x$

$A' = 0$ at $x = 25$

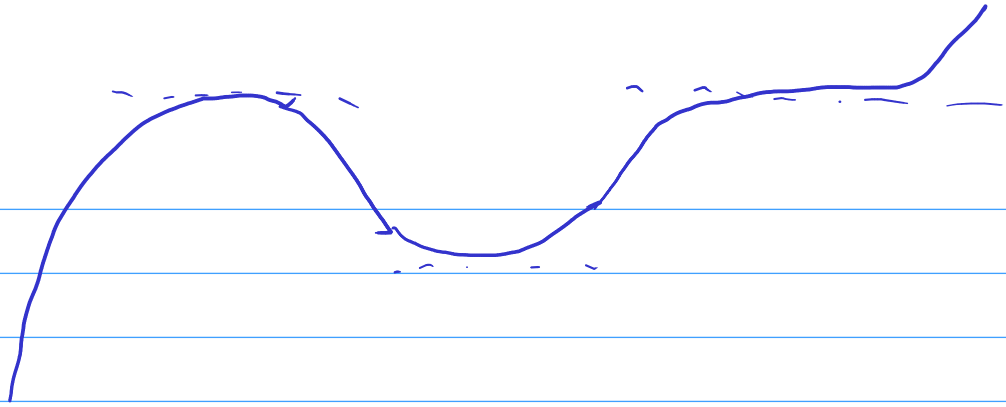
$100 = 2x+2y$

$A = xy$

$100 - 2x = 2y$

$50 - x = y$

$A = x(50-x)$



$50 - 2x$

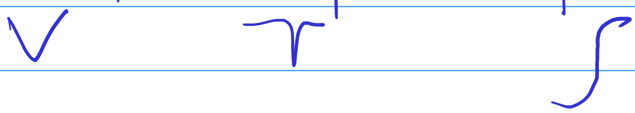
$A'' = -2$

$x = 25$ $x = 24$ $x = 26$

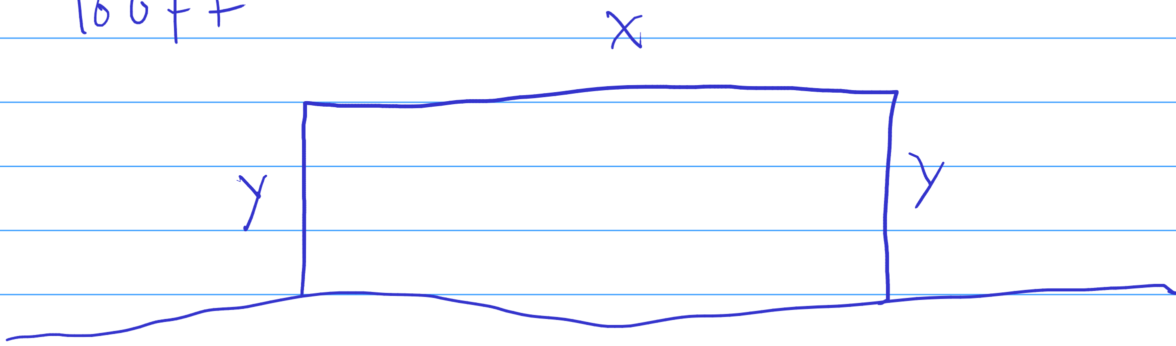
$50 - 48 = 2$ $50 - 52 = -2$

Derivative does not exist at:

Corner Cusp Vert. tangent



100 ft



Perimeter $= 2y + x = 100$

Area $= xy$

$x = 100 - 2y$

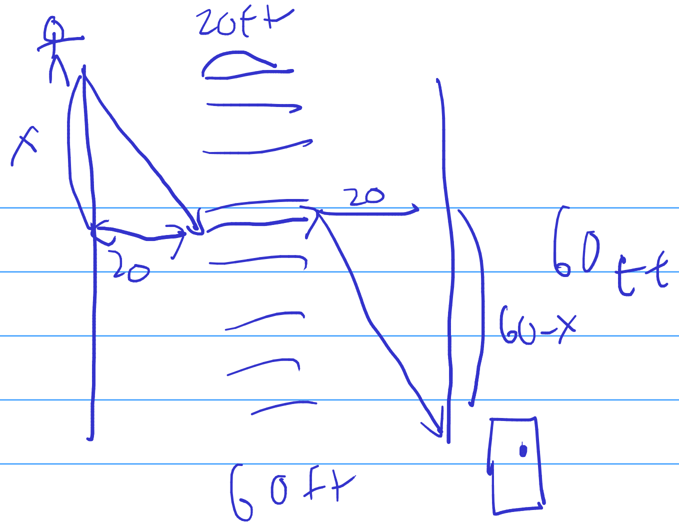
Area $= (100 - 2y)(y)$

$100y - 2y^2$

$A' = 100 - 4y$

$4y = 100$

$y = 25$



$$L = \sqrt{x^2+20^2} + 20 + \sqrt{(60-x)^2+20^2}$$

$$\sqrt{x^2+400} + 20 + \sqrt{3600 - 120x + x^2 + 400}$$

$$\sqrt{x^2+400} + 20 + \sqrt{4000 - 120x + x^2}$$

$$L' = \frac{1}{2}(x^2+400)^{-\frac{1}{2}}(2x) + 0 + \frac{1}{2}(x^2-120x+4000)^{-\frac{1}{2}}(2x-120)$$

$$\frac{x}{\sqrt{x^2+400}} + \frac{x-60}{\sqrt{x^2-120x+4000}}$$

$x = 30$

$x = 0$

$x = 60$

$20 + 2\sqrt{1300}$ $\quad x = 30$

$20 + \sqrt{3800} + 20 = 0$ or 60