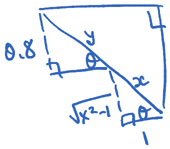
ch5Review_21??

June-12-13
1:25 PM



similar Δ's. $\dfrac{\sqrt{x^2-1}}{0.8} = \dfrac{x}{y}$

$$y = \frac{0.8x}{\sqrt{x^2-1}}$$

Maximize: $L = x+y$

$$L = x + \frac{0.8x}{\sqrt{x^2-1}}$$

domain $x \in (1, \infty)$

need $\sqrt{x^2-1} > 0$

$x^2-1>0$

$(x+1)(x-1)>0$

$\cancel{x<-1}$ or $x>1$

can't be neg.

crit. pts: $L' = 1 + \dfrac{\sqrt{x^2-1}\,(0.8) - 0.8x\left(\cancel{\tfrac{1}{2}}\right)(x^2-1)^{-1/2}\left(\cancel{2x}\right)}{x^2-1}$

$$L' = 1 + \frac{(x^2-1)^{-1/2}\,0.8\left[\cancel{x^2}-1-\cancel{x^2}\right]}{(x^2-1)^{1}}$$

$$0 = 1 - \frac{0.8}{(x^2-1)^{3/2}}$$

$$0 = \frac{(x^2-1)^{3/2} - 0.8}{(x^2-1)^{3/2}}$$

$(0.8)^{2/3} = \left((x^2-1)^{3/2}\right)^{2/3}$

$\pm\sqrt{0.8^{2/3}+1} = x$

$\pm 1.36 \doteq x$

only $x = 1.36$ in domain

use this $L'(x) = 1 - 0.8(x^2-1)^{-3/2}$

show MAX:

$L''(x) = -0.8\left(-\tfrac{3}{\cancel{2}}\right)(x^2-1)^{-5/2}\left(\cancel{2}x\right)$

$L''(1.36) = $ pos CU ∴ MIN

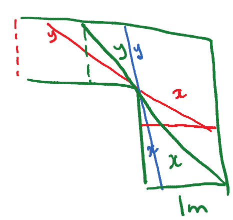
check near pt
$L(1.34) = 2.5418$
$L(1.36) = 2.54033\ldots$ ← MIN
$L(1.38) = 2.54088$

why does it ask for longest then??

answer question: $L = x+y$

$\doteq 1.36 + 1.18$

$= 2.54$ m



x can be long, y short
or
x can be short, y long

ie. Maximizing x minimizes y and vise versa

$y > 0.8$
$x > 1$
$x+y > 1.8$

and sum of $\boxed{x+y}$ is concave up for $x>1$
∴ finding minimum