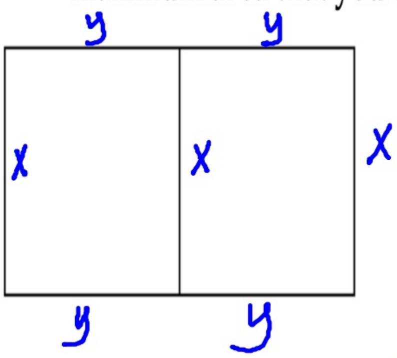
5) Suppose you had 12 meters of fencing to make two side-by-side enclosures as shown. What is the maximum area that you could enclose?



primary

$A = 2xy$

$A = 2x\left(\frac{12-3x}{4}\right)$

$A = \frac{1}{2}x(12-3x)$

$A = 6x - \frac{3}{2}x^2$

$A' = 6 - 3x$

$0 = 6 - 3x$

$2 = x$

secondary

$12 = 3x + 4y$

$\frac{12-3x}{4} = y$

$\frac{3}{2} = y$

$2\left(2\left(\frac{3}{2}\right)\right) = 6\,m^2$

An open rectangular box has a square base and a volume of 500 cubic inches. What dimensions minimize the amount of cardboard needed to make the box?

Answer: 10 in, 10 in, 5 in

Find two numbers whose difference is 100 and whose product is a minimum.

primary

secondary

$x - y = 100$

$P = xy = (100+y)y = 100y + y^2$

$x = 100 + y$

$P' = 100 + 2y$

$\boxed{-50} = y$

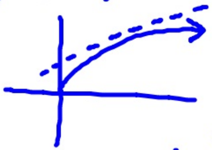
$\boxed{50} = x$

Approximate the square root of 99. Is this an under or over approximation? Explain.

$f(x)=\sqrt{x}$

$f'(x)=\frac{1}{2\sqrt{x}}$

$f'(100)=\frac{1}{20}$



$f''(100)<0$

over

$(100, 10)$ $(99, \_\_)$

$y-10=\frac{1}{20}(x-100)$

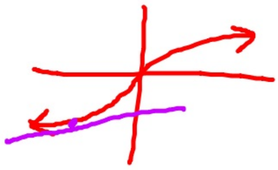
$y-10=\frac{1}{20}(99-100)$

$y=-\frac{1}{20}+10=9\frac{19}{20}$

9.95

$\sqrt{99}=9.94987\ldots$

Approximate the cube root of -125.1. Is this an over or under approximation? Explain.



$f(x) = \sqrt[3]{x}$ $\quad (-125, -5) \quad (-125.1, \_\_\_)$

$f'(x) = \dfrac{1}{3x^{2/3}}$

$f'(-125) = \dfrac{1}{3(-125)^{2/3}}$

$= \dfrac{1}{75}$

$f''(-125) > 0;$ under

$y + 5 = \dfrac{1}{75}(x + 125)$

$y + 5 = \dfrac{1}{75}(-125.1 + 125)$

$y = \dfrac{1}{75}\left(-\dfrac{1}{10}\right) - 5$

$= -\dfrac{1}{750} - 5 = -5\dfrac{1}{750}$

5.) $P = 147$ $\qquad S = x + 3y$ (min.)

$xy = 147$ $\qquad$ primary