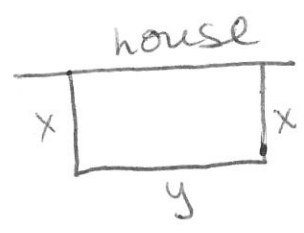


Key

Elements of Calculus I, MATH 180 Quiz 10
Janet Vassilev

- (1) Joe bought 50 feet of fencing to make a rectangular rabbit enclosure next to his house. What are the dimensions of the enclosure which provides the rabbits with the maximum area to hop around in?



$2x + y = 50 \Rightarrow y = 50 - 2x$

$0 \leq x \leq 25$
 $0 \leq y \leq 50$

$A = xy = x(50 - 2x) = 50x - 2x^2$

$A(0) = 0$ $A(25) = 25(50 - 2 \cdot 25) = 0$

$A'(x) = 50 - 4x = 0 \Rightarrow x = 12.5$
is a critical value

$A(12.5) = 50 \cdot (12.5) - 2(12.5)^2 = 625 - \frac{625}{2} = \frac{625}{2} \text{ max}$

Dimensions 12.5ft by 25ft

out of 10

- (2) If $C(x) = 25x^2 + \frac{3200}{x}$ is the cost of making a box of dimensions x by x by $\frac{800}{x}$ in cents, what is the minimum cost of producing the box? (Hint: The domain of $C(x)$ is $(0, \infty)$. You must look at the behavior of C near 0 and ∞ .)

extra credit (out of 5)

$\lim_{x \rightarrow 0^+} C(x) = \lim_{x \rightarrow 0^+} 25x^2 + \frac{3200}{x} = \infty$

$\lim_{x \rightarrow \infty} C(x) = \lim_{x \rightarrow \infty} 25x^2 + \frac{3200}{x} = \infty$

$C'(x) = 50x - \frac{3200}{x^2} = \frac{50x^3 - 3200}{x^2} = 0$
 $\Rightarrow 50x^3 = 3200$ or $x^3 = 64$
or $x = 4$ a critical value

$C(4) = 400 + 800 = 1200$ cents
so \$12.