FAR BEYOND

MAT122

Optimization

Stony Brook University

Find Extrema w Differentiation – Application

ex. A hobby store has 20 ft of fencing to fence off a rectangular area in the corner of a room to display an electric train setup.

What are the dimensions that will maximize this area?

What is the maximum area?

Follow up Question:
Is x a minimum or a maximum?

$x = 10$ feet

$y = 10$ feet

$A = 100$ sq ft

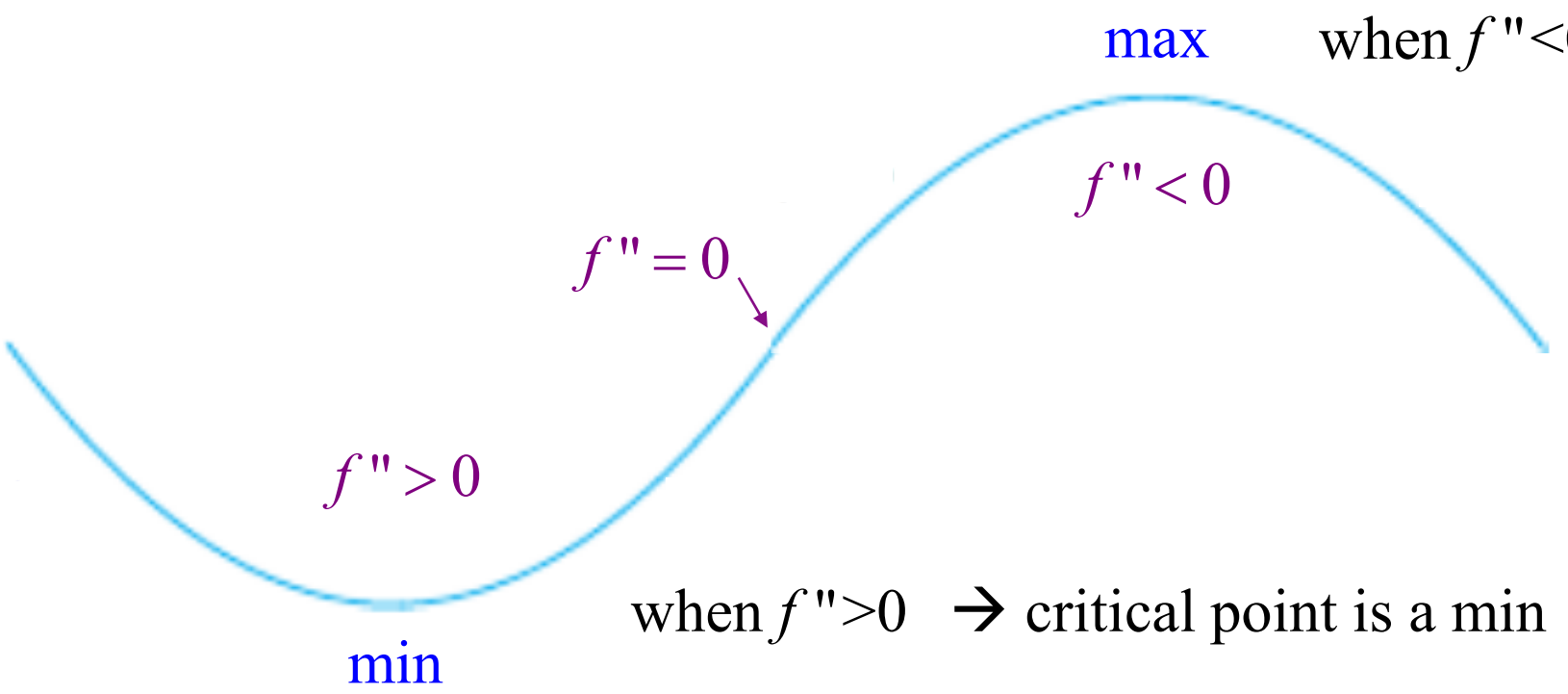
Meanings of Derivatives – Review #2

Concavity

If $f'' > 0$ on an interval then f is **concave up** on that interval.

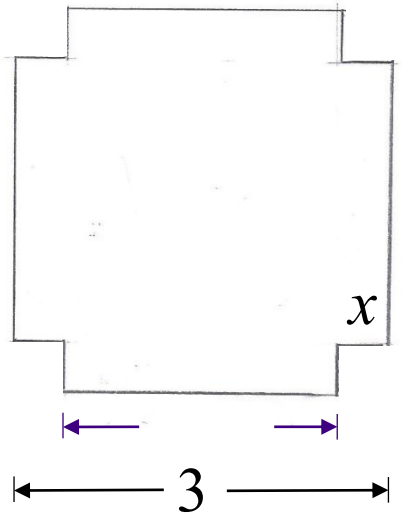
If $f'' < 0$ on an interval then f is **concave down** on that interval.

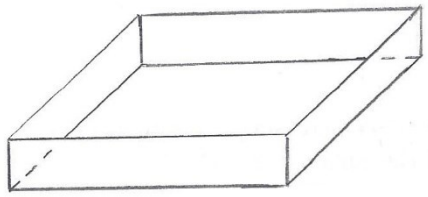
when $f'' = 0$ f can have an inflection point



Optimize the Size of Square Packaging

Find the largest volume of a box constructed from a square piece of cardboard, 3 feet wide, by cutting out a square from each of the corners and bending up the sides. The box has an open top.

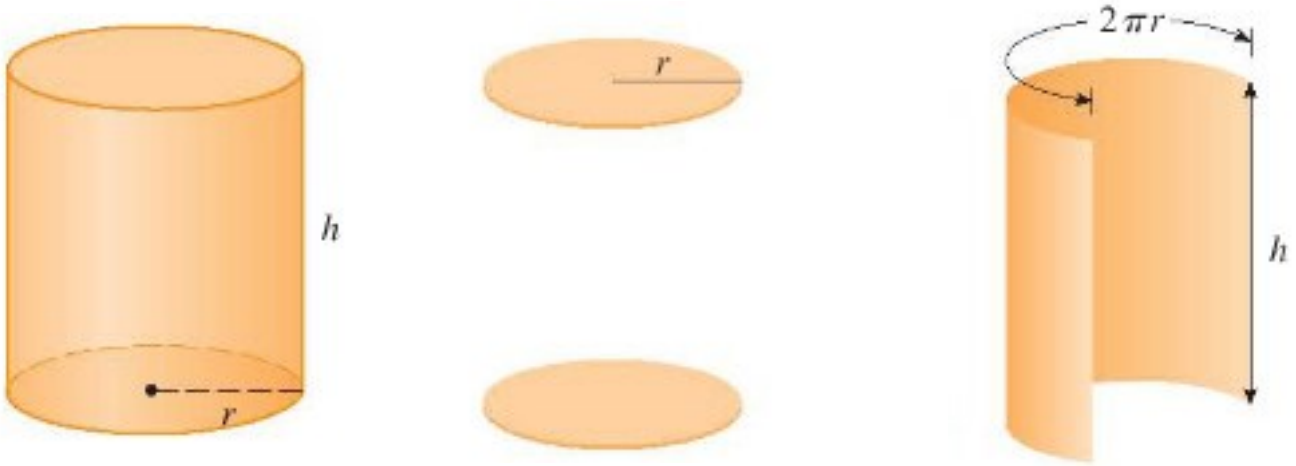




Largest volume, $2\,ft^3$, occurs when $x = 1/2$

Optimize the Size of Cylindrical Packaging

A cylindrical can is made to hold 1000 cm^3 of oil. Find the dimensions that will minimize manufacturing costs.



Optimize the Size of Cylindrical Packaging (cont'd)

A cylindrical can is made to hold 1000 cm^3 of oil. Find the dimensions that will minimize manufacturing costs.

$$r = \sqrt[3]{\frac{500}{\pi}}$$

$$= 2 \cdot \sqrt[3]{\frac{500}{\pi}}$$

$$h = 2r$$