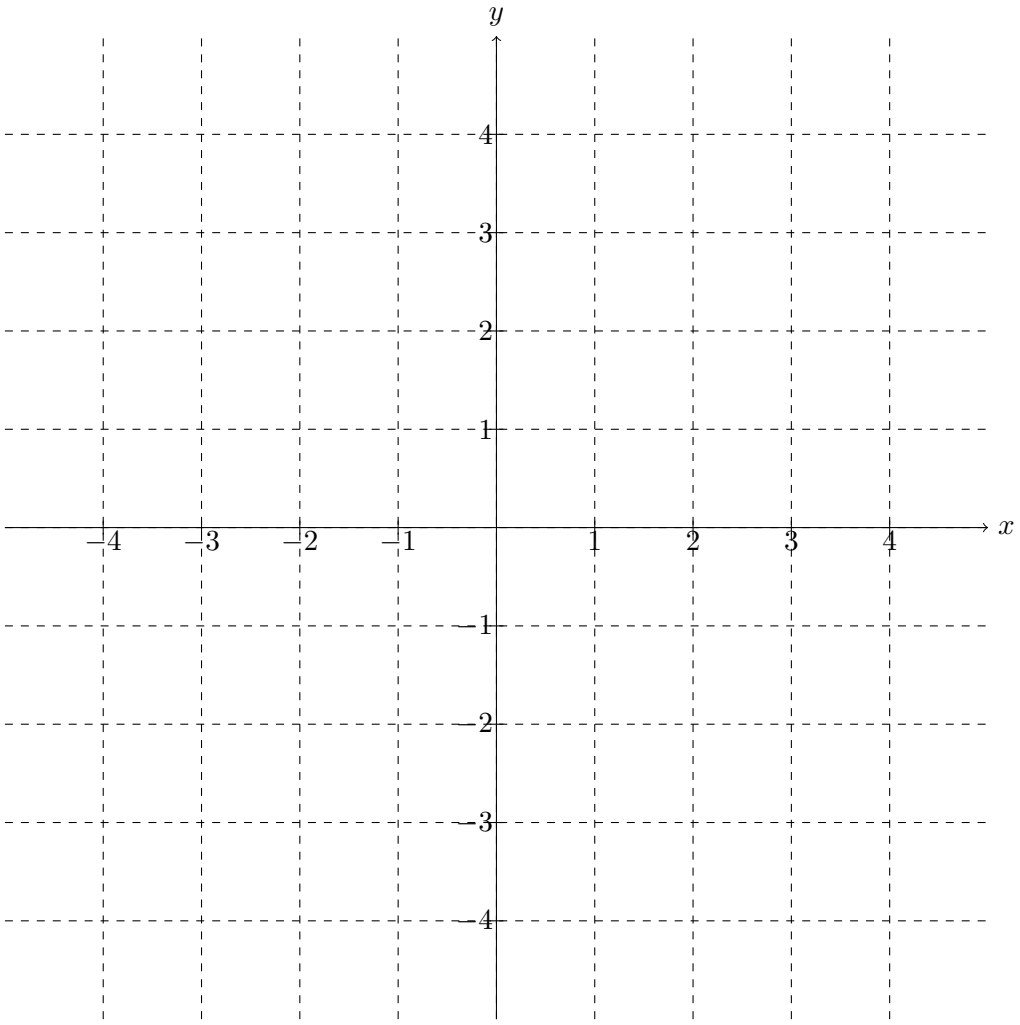
Calculus I - MAC 2311 - Section 003

10/29/2018

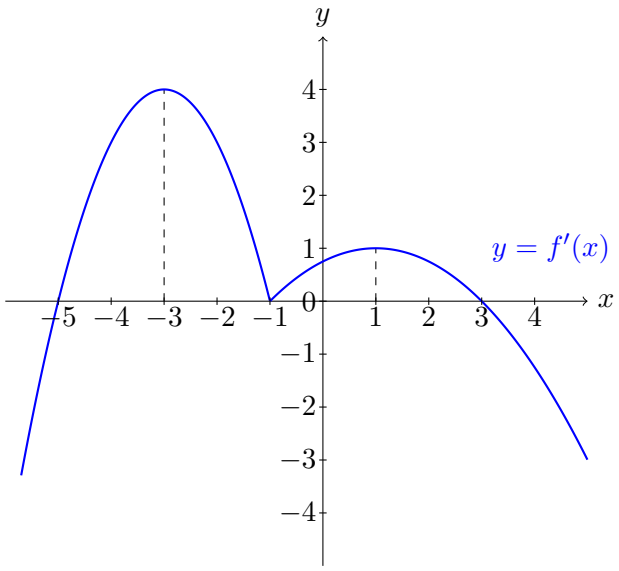
Ex 1. Sketch the graph of **a** function f that satisfies **all of the given conditions**:

a) $\lim_{x\to-\infty} f(x) = 3$;
b) $f'(x) < 0$ on $(-\infty, 0)$;
c) (-2,2) is an inflection point;
d) f has a local minimum at 0;
e) $f''(x) > 0$ on $(-2, \infty)$
f) $f'(2) > 0$.

Make sure that your graph is the graph of a function, i.e. it passes the vertical line test.



Ex 2. The graph of the derivative f' of a function f is shown below.



a) What are the critical numbers of f?
b) Over which intervals is the function f increasing/decreasing?
c) At what numbers does f have a local minimum/maximum value?
d) Over which intervals is f concave down/up?
e) What are the x-coordinates of the inflection points?

Ex 3. Find two integers whose sum is 32 and product is maximum.

Ex 4. Among all rectangles with area 25 cm^2, what are the dimensions of that one that has the smallest perimeter?

Ex 5. A farmer has 2400 ft of fencing and wants to fence off a rectangular field that borders a straight river. He needs no fence along the river. What are the dimensions of the field that has the largest area?

Ex 6. Giovanni wants to construct a rectangular swimming pool of fixed volume 1620 cubic feet so that the width of its base is twise the lenght. On the floor he wants to use tiles that cost \$100 per square feet and on the sides he wants to use tiles that cost \$60 per square feet. Which is the minimum amount of money that Giovanni has to spend in order to build such a swimming pool? How deep would the swimming pool that minimizes the cost be?

Ex 7. Find the point on the curve $y = \sqrt{x}$ which is closest to the point $(3, 0)$.