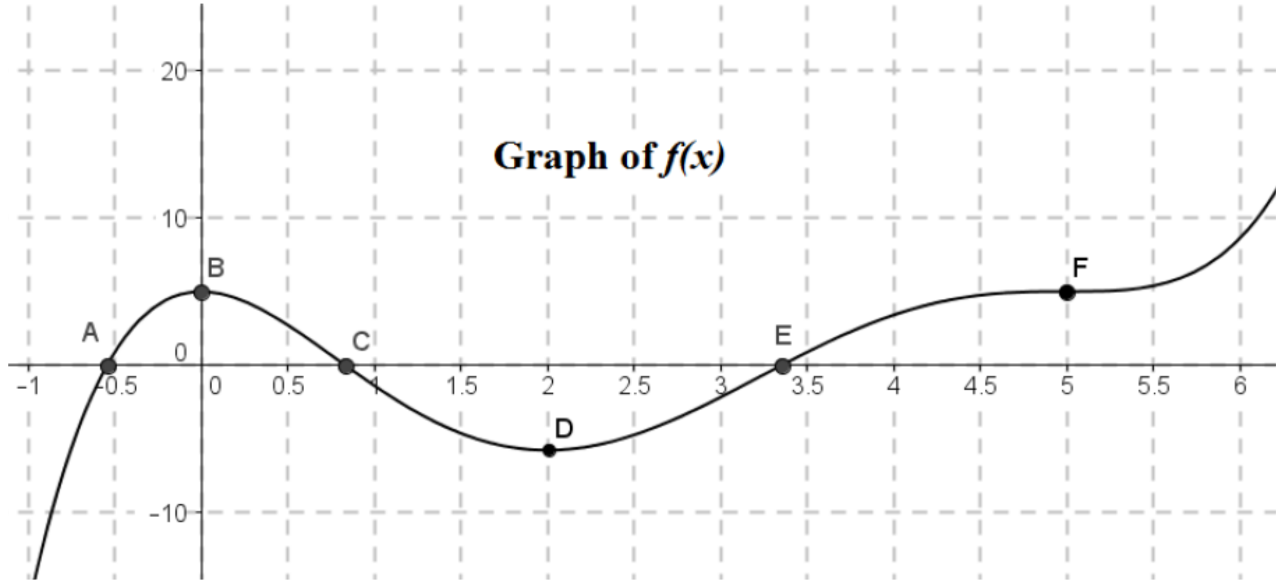
Closing Tues: HW 10.1

Closing Thurs: HW 10.2

Exam 1 will be returned Tues



10.1 Curve Sketching (relative max/min)

Entry Task: Consider the given $y = f(x)$ graph.
What can you conclude
about f'(x) at each of the given points?

Terminology:

If $f'(x) = 0$ at $x = a$, then we say $x = a$ is a ***critical value*** (or ***critical number***) and

$(x, y) = (a, f(a))$ is call a ***critical point***.

We say $y = f(x)$ has a **relative maximum** (or **local maximum**) at $x = a$ if the function changes from increasing to decreasing at $x = a$.

We say $y = f(x)$ has a **relative minimum** (or **local minimum**) at $x = a$ if the function changes from decreasing to increasing at $x = a$.

An ***optimum*** is a max or min.

We say $y = f(x)$ has a **horizontal point of inflection** at $x = a$ if the function does not change direction (stays inc. to inc. or dec. to dec.).

Once again don't forget the following table which is fundamental to all applications:

$f(x)$	$f'(x)$
horiz. tangent	zero
increasing	positive
decreasing	negative

Example:

Let $f(x) = x^3 - 6x^2 - 15x + 17$

(a) Find the critical values.

(b) Find the critical points.

(c) Find the intervals over which f(x) is increasing (and over which it is decreasing).

(d) Classify the critical numbers and draw a rough sketch of $y = f(x)$.

Example:

Let $f(x) = 1 + x^3 - \frac{1}{4}x^4$

(a) Find the critical values.

(b) Find the critical points.

(c) Find the intervals over which f(x) is increasing (and over which it is decreasing).

(d) Classify the critical numbers and draw a rough sketch of $y = f(x)$.

Example:

Let $f(x) = \sqrt{x^2 + 6x + 100}$

(a) Find the critical values.
(b) Find the critical points.
(c) Find the intervals over which f(x) is increasing (and over which it is decreasing).
(d) Classify the critical numbers and draw a rough sketch of $y = f(x)$.