

# MATH 150

## Today

1. WeBWorK/Homefun questions
2. 3.2: Curve Sketching I

### Goals:

1. Curve sketching using the first derivative (Understand what the first derivative tells us about the graph of a function)
2. Intervals of increase/decrease (Understand that  $f'(x) > 0$  when the function is increasing, and  $f'(x) < 0$  when it is decreasing)

## Where is today's material used?

1. Using critical points to find local extrema is a technique that appears in math, physics, chemistry, economics, and any discipline requiring optimization.

## 3.2 Curve Sketching I

1. Functions are increasing on intervals where the first derivative is positive.
2. Functions are decreasing on intervals where the first derivative is negative.
3. **Theorem:** Functions with the same derivative differ by a constant.
4. **Theorem:** (First Derivative Test) Let  $c$  be a critical point of  $f$ , and suppose  $f$  is “nice” near  $c$ . If  $f'$  changes from positive to negative at  $c$ , then  $f(c)$  is a local maximum. If  $f'$  changes from negative to positive at  $c$ , then  $f(c)$  is a local minimum. If  $f'$  does not change sign at  $c$ , then  $f(c)$  is neither a local maximum nor a local minimum.
5. Examples. p. 243: 20, 21, 23, 25, 28, 34, 31, 42, 43, 47, 55, 64

## Next Time

1. Watch 3.3: Curve Sketching 2 [20 min]