MATH 150

Today

1. 3.3: Curve Sketching 2

Goals:

1. Curve sketching using the second derivative (Understand what the second derivative tells us about the graph of a function)
2. Concavity (Understand that $f''(x) > 0$ when the function is concave up, and $f''(x) < 0$ when it is concave down)

Where is today's material used?

1. The second derivative is extremely important in physics applications (acceleration is the second derivative of the position function).
2. Economics: the second derivative describes the change in marginal cost/revenue/profit.

3.3 Curve Sketching II

1. Functions are concave up on intervals where the second derivative is positive .
2. Functions are concave down on intervals where the second derivative is negative (first derivative is decreasing).
3. Concavity changes at **inflection points**.
4. **Theorem:** (Second Derivative Test) Let c be a critical point of f such that $f'(c) = 0$, and suppose f is "nice" near c. If $f''(c) > 0$, then $f(c)$ is a local minimum. If $f''(c) < 0$, then $f(c)$ is a local maximum. If $f''(c) = 0$, then the test fails.
5. Examples. p. 257: 23, 36, 48, 52, 55, 60, 61, 65, 67, 68

Next Time

1. Watch 3.4: Optimization [30 min]