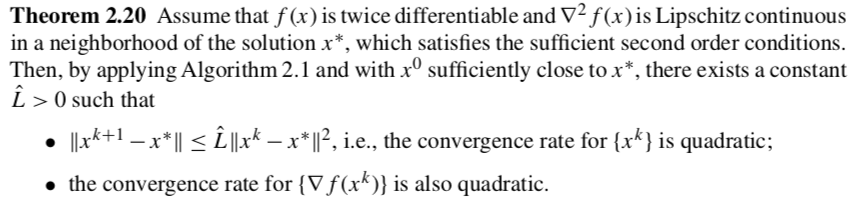
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**Claim 1.** The convergence rate for is quadratic.

Step 1. What does the continuity of the second derivative tell us?

Step 2. Consider the Newton step . Add to both sides.

Step 3. Work through algebra on RHS to obtain…

Step 4. Recall and apply to RHS.

Step 5. Take norms of both sides. Recall the Cauchy–Schwarz inequality .

Step 6. Invoke continuity properties (see Step 1).

**Claim 2.** The convergence rate for is quadratic.

Start with .

Step 1. Add to both sides.

Step 2. Take norm of both sides.

Step 3. Recall .

Step 4. Invoke Lipschitz continuity.

Step 5. Substitute

