Please prove (or explain as appropriate) all your answers.

**Question 1.** Suppose that \( f \) is differentiable at \( x_0 \), and \( f'(x_0) < 0 \).

Prove that in some neighborhood of \( x_0 \), we have

\[
\begin{align*}
  f(x) &> f(x_0) \text{ for every } x < x_0, \\
  f(x) &< f(x_0) \text{ for every } x > x_0.
\end{align*}
\]

(We proved a similar statement in class for the case \( f'(x_0) > 0 \). Please mimic the proof of that statement here, working from definitions.)

Do question 29.7 from the book. **Hint:** use corollary 29.4 on p.216.


Do question 29.5. **Hint:** prove (from definition) that \( f'(x) = 0 \) if the function satisfies the given inequality.