1. Let $I$ and $J$ be intervals of $\mathbb{R}$ and let $f : I \rightarrow J$ be a monotone continuous function. Show that if $f$ is differentiable at $c$ and if $f'(c) \neq 0$, then $f^{-1}$, the inverse of $f$ is differentiable at $f(c)$ and $(f^{-1})'(f(c)) = \frac{1}{f'(c)}$.

Consequently the above statement is true for all $x$ such that $f'(f^{-1}(x)) \neq 0$. Illustrate the result on $f(x) = x^3$.

2. Assume that the function $f$ defined by $f(x) = 5x + \sin(\pi x)$ is strictly increasing on $\mathbb{R}$ and find $(f^{-1})'(10)$.

3. Use the Mean Value Theorem to show that:

$$\frac{x}{1+x} \leq \ln(1+x) \leq x$$

for all $x > -1$.

4. Show that $|x^2 - 9|$ is differentiable on $\mathbb{R} \setminus \{-3, 3\}$

5. Do number 5 on page 132 in the text book.