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1. [10] Can the Principal of Mathematical Induction be used to prove statements of the form $(\forall r \in \mathbb{Q})(P(r))$, where $P(r)$ is a statement for all rational numbers r ?
 2. [20] Please do parts (a) and (b) of Problem 18 for Section 4.1 on page 184 in the Sundstrom book.
 3. [10] Write a proof in paragraph form of the identity $1 + 2 + 2^2 + \cdots + 2^n = 2^{n+1} - 1$ using mathematical induction.
 4. [12] Write a proof in paragraph form of the identity $3|(n^3 - n)$ using mathematical induction.
 5. [12] Write a proof in paragraph form of the identity $n < 2^n$ using mathematical induction.
 6. [12] Investigate the higher derivatives of $y = e^{ax}$ ($a \in \mathbb{R}$, x is the independent variable and y the dependent variable.) Find a formula and prove it using mathematical induction.
 7. [12] Repeat the previous question for $y = xe^x$.
 8. [12] Repeat the previous question for $y = xe^{2x}$.