MATH 224
FOUNDATIONS
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Worksheet 3
§ 2.3

Prove or disprove the following claims:

1. $9^n - 4^n$ is a multiple of $5 \; \forall \; n \in \mathbb{N}$

2. $3^{(2n+1)} - 2^{(n+2)}$ is divisible by $7 \; \forall \; n \in \mathbb{N}$

3. $3^{(2n+1)} + 2^{(n+2)}$ is divisible by $7 \; \forall \; n \in \mathbb{N}$

4. Let $r \in \mathbb{R}$ where $r \neq 1$ nor where $r \neq 0$, $\sum_{i=0}^{n} r^i = \frac{1 - r^{(n+1)}}{1 - r} \; \forall \; n \in \mathbb{N}$

5. Let $x \in \mathbb{R}$ where $1 + x > 0$, $(1+x)^n \geq 1 + n \cdot x \; \forall \; n \in \mathbb{N}$

page 52 of Barnier and Feldman: 1, 2, 5, and 10