Proposition 1. *Let $x \neq 1$ be a real number. Then*

$$\frac{x^n - 1}{x - 1} = x^{n-1} + x^{n-2} + \ldots + x^2 + x + 1$$

for all $n \in \mathbb{N}$.

Proof. $\square$

Proposition 2. *Let $n \in \mathbb{N}$. Then $\sum_{k=1}^{n}(2k+1) = n^2 + 2n$.*

Proof. $\square$

Proposition 3. *Let $k \in \mathbb{N}$. If $0 < x < y$ then $x^{2k-1} < y^{2k-1}$.*

Proof. $\square$

Proposition 4. *Let $f : \mathbb{R} \to \mathbb{R}$ be a function such that $f(x+y) = f(x)+f(y)$ for all $x, y \in \mathbb{R}$. Then $f(n) = nf(1)$ for $n = 0, 1, 2, \ldots$.*

Proof. $\square$

Proposition 5. *Let $n \geq 2$. Then $\sqrt{n} < \frac{1}{\sqrt{1}} + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \ldots + \frac{1}{\sqrt{n}}$.*

Proof. $\square$

Proposition 6. *Let $a_0, a_1, \ldots$ be a sequence of integers defined by $a_0 = 2, a_1 = 2, a_2 = 6$ and $a_k = 3a_{k-3}$ for all integers $k \geq 3$. Then a_n is even for all integers $n \geq 0$,*

Proof. $\square$

Proposition 7. *The product of n odd integers is odd for every $n \geq 1$.*

Proof. $\square$