[redacted]

Exercise 3: Prove that for any real number *r*,

$$\sum_{i=0}^{n} = \frac{(1-r^{n+1})}{1-r}$$

Claim:

$$\sum_{i=0}^{n} = \frac{(1-r^{n+1})}{1-r}$$

*We can expand and manipulate the left side to the n+1 statement.

$$r^0 + r^1 + r^2 + r^3 + \ldots + r^n + r^{n+1} = \frac{(1-r^{n+2})}{1-r}$$

$$\mathbf{r^0 + r^1 + r^2 + r^3 + \ldots + r^n} + r^{n+1} =$$

*Replace bold w/original equation.

$$\frac{(1-r^{n+1})}{1-r} + r^{n+1} =$$

$$\frac{(1-r^{n+1})}{1-r} + r^{n+1}\frac{(1-r)}{(1-r)} =$$

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

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

Conclusion: Since we proved the n+1 statement to be true, we also proved our original claim to be true.