

1. Use induction to prove that  $1 + r + \dots + r^{n-1} = \frac{r^n - 1}{r - 1}$  for  $n \geq 1$  where  $r \neq 1$  is some variable.

2. Use induction to prove that  $n < 2^n$  for all  $n \geq 0$ .

3. Find the quotient and remainder when 1612 is divided by 74. Be sure to write your answer in the form:  $a = bq + r$ .

4. Use the Division Algorithm to prove that the cube of any integer has to be exactly one of these forms:  $9k$  or  $9k + 1$  or  $9k + 8$  for some integer  $k$ .

5. a) Read Appendix A, and answer the following questions. What are the methods used to write proofs? Have we used any of these methods in class? If so, which one(s)?

b) Find an article written in a mathematics journal (Notices of the American Mathematical Society is one such journal). Answer the following questions:

Author:

Article Title:

Journal Title:

Vol. and Issue Number:

Page Numbers: