[30] **Homework 2**: *Mathematical Induction*

Due: February 2, by the end of class.

[10] Prove by induction that

$$1 + a^1 + a^2 + a^3 + \ldots + a^n = \frac{a^{n+1} - 1}{a - 1}.$$

Show the basis step, the inductive hypothesis and the inductive step.

[10] Using induction, verify that each equation is true for every positive integer n.

$$1^3 + 2^3 + 3^3 + \cdots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$$

[10] For the following pseudo-code determine the value returned in terms of n. Use big-Oh notation. Show your work.

int **function** sqr (int n)
if $(n \leq 2)$
then return(1)
else return$(1 + \text{sqr}(\sqrt{n}))$