

Homework 6

5.8. 18,20,25,29,39,41.

A. Give a proof by induction of the formula for $\sum_{j=1}^n j^3$ that you obtained in problem 20 (failing that you can find the necessary summation formula in almost any calculus book).

B. Give a proof by induction of formula (5.13):

$$\sum_{j=0}^n \binom{r+j}{j} = \binom{r+n+1}{n}$$

for all real numbers r and $n = 0, 1, 2, \dots$

C. Give a proof by induction that $4^n - 3n - 1$ is a multiple of 9 for all $n \in \mathbb{N}$.

D. Give a proof by induction that $2^{3^n} + 1$ is a multiple of 3^{n+1} for all $n \in \mathbb{N}$.