



## STEP II, 1998, Q1

- 1 Show that, if  $n$  is an integer such that

$$(n - 3)^3 + n^3 = (n + 3)^3, \quad (*)$$

then  $n$  is even and  $n^2$  is a factor of 54. Deduce that there is no integer  $n$  which satisfies the equation (\*).

Show that, if  $n$  is an integer such that

$$(n - 6)^3 + n^3 = (n + 6)^3, \quad (**)$$

then  $n$  is even. Deduce that there is no integer  $n$  which satisfies the equation (\*\*).



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