**Given sequence as**

I will now solve for the explicit formula (which would be useful in proofs later).

We know that . Thus…

Thus…

**PLEASE SEE NEXT PAGE ->**

Prove that

(Colloquially, starting at , the pattern onwards is odd-even-odd infinitely.)

Basis Step: prove

|  |  |  |
| --- | --- | --- |
| 1 |  | To be proved |
| 2 |  | Definition of even |
| 3 | … | Algebra |
| 4 |  | Algebra |
| 5 |  | As shown |
| 6 |  | Definition of odd, noting that 2 is not a multiple of 3a |
| 7 | … | Algebra |
| 8 |  | Algebra |
| 9 |  | As shown |
| 10 |  | As shown |
| 11 |  | As shown |

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Inductive Step: prove

* 1. is inductive hypothesis
  2. is general successor with property P
  3. is inductive hypothesis
  4. is general successor with property P

|  |  |  |
| --- | --- | --- |
| 12 |  | To be proved |
| 13 |  | Instantiate by closure |
| 14 |  | Substitute into inductive hypothesis |
| 15 |  | Tedious algebra |
| 16 |  | Definition of |
| 17 |  | By direct proof |
| 18 |  | To be proved |
| 19 |  | Instantiate by closure |
| 20 |  | Substitute into inductive hypothesis, noting that which is not allowed |
| 21 |  | Tedious algebra |
| 22 |  | Definition of |
| 23 |  | By direct proof |
| 24 |  | As shown 11, 17, 23 |
| 25 |  | By mathematical induction |