

INDUCTION WARMUP

(1) Which of the following are expressions that represent the sum of the first n odd integers?

a) $1 + 3 + 5 + \dots + (2n + 1)$

b) $1 + 3 + 5 + \dots + (2n - 1)$

c) $1 + \dots + (2n - 1)$

d) $1 + 2 + \dots + (2n - 1)$

e) $1 + 3 + 5 + \dots + n$

f) $1 + 3 + 5 + \dots + n + 1$

(2) If the first question was challenging, how could you figure it out? Talk about this in your group.

(3) Now write down an expression for the sum of the first $n + 4$ odd numbers after and including 5.

(4) Write down an expression for the sum of the first n numbers of the form 1 modulo 3.

Advice A good tip is that if you are stuck - just try to write down 4 numbers or 5 numbers or 6 numbers until you see a pattern and can write n numbers.

0.1. **Now choose one of the following three problems - your group will give a presentation of your proof by induction.**

- Find a formula for your expression in number (3) above and prove that formula using induction.
- Consider the function $f : \mathbb{N} \rightarrow \mathbb{N}$ defined by $f(1) = 1$ and $f(n) = 2f(n - 1) + 1$. Find an explicit formula for $f(n)$ and prove your formula is correct by induction.