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1. Question 1

   (a) $\sum_{i=1}^{n}(2i-1)$
   $n=1 \quad \sum_{i=1}^{n}(2i-1)=1$
   $n=2 \quad \sum_{i=1}^{n}(2i-1)=1+3=4$
   $n=3 \quad \sum_{i=1}^{n}(2i-1)=4+5=9$
   $n=4 \quad \sum_{i=1}^{n}(2i-1)=9+7=16$
   A possible formula for this summation would be $f(n)=n^2, n\geq 1$

   (b) Proof by mathematical induction
   $n^2=\sum_{i=1}^{n}(2i-1)$
   Base case: $1^2=\sum_{i=1}^{1}(2i-1)$
   $1=2-1$

   Assume:
   $n^2=\sum_{i=1}^{n}(2i-1)$
   $(n+1)^2=\sum_{i=1}^{n+1}(2i-1)$
   $\sum_{i=1}^{n+1}(2i-1)=\sum_{i=1}^{n}(2i-1)+2(n+1)-1$
   $(n+1)^2=n^2+2n+1$
   $n^2+2n+1=\sum_{i=1}^{n}(2i-1)+2n+1$

   Subtract $(2n+1)$ from each side
   $n^2=\sum_{i=1}^{n}(2i-1)$

   It is assumed that $n^2=\sum_{i=1}^{n}(2i-1)$ from the inductive step. Therefore, the formula is correct.

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2. Question 2

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3. Question 3

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4. Question 4

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5. Question 5

   (a)

   (b)

   (c)