University of Bahrain
Bahrain Teachers College
TC2MA324: History of Mathematics
Dr. Abdulla Eid
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Quiz 5

Name: _____

1. (3 points) Prove that the sum of the first $n+1$ terms of a geometric sequence is given by

$$a + ar + ar^2 + ar^3 + \cdots + ar^{n-1} + ar^n = \begin{cases} \frac{a(r^{n+1}-1)}{r-1}, & \text{if } r \neq 1 \\ \\ a(n+1), & \text{if } r = 1 \end{cases}$$

2. (6 points) Find the sum of each of the following:

   (a) $2 + 4 + 8 + 16 + \cdots + 1024$

   (b) $\displaystyle\sum_{i=0}^{20} 5 \left(\frac{2}{3^2} \right)^i$

   (c) $1 + \dfrac{2}{3} + \dfrac{4}{9} + \dfrac{8}{27} + \ldots$

   (d) $0.3 + 0.03 + 0.003 + 0.0003 + \ldots$

3. (4 points) In this problem, you will need to guess a formula for the sum of the first n odd natural numbers using the geometry (similar to Gauss' original idea, but here try to create a square!)

    (a) ($n = 2$) find the sum of $1 + 3$.

    (b) ($n = 3$) find the sum of $1 + 3 + 5$.

    (c) ($n = 4$) find the sum of $1 + 3 + 5 + 7$.

    (d) ($n = 5$) find the sum of $1 + 3 + 5 + 7 + 9$.

    (e) Guess a formula for the sum

    $$1 + 3 + 5 + 7 + \cdots + (2n - 1)$$

    (To prove, you will need to use the mathematical induction, but it is not required here.)