Arithmetic Sequences & Series

i. State whether the sequences given by the following n^{th} terms are arithmetic or not:

- $u_n = 4n$
- $u_n = 3n - 1$
- $u_n = n^2$
- $u_n = 5 + {}^1\!/_2(n)$
- $u_n = 1^n$
- $u_n = \dfrac{1}{n}$
- $u_n = n^3 + n$
- $u_n = 2^n$

ii. Write the following arithmetic sums in Sigma (Σ) notation:

- $2 + 4 + 6 + 8$
- $4 + 7 + 10$
- $10 + 20 + 30 + 40 + 50$
- $5 + 3 + 1 + (-1) + (-3)$
- $(-5) + (-10) + (-15)$
- $2 + 6 + 10 + 14$
- $15 + 13 + 11 + 9$
- $20 + 35 + 50$
- $49 + 57$
- $1 + 5 + 9 + 13$

iii. Calculate (by hand - not using the sum formula) the following summations:

- $\sum_{n=1}^{5} n$
- $\sum_{k=1}^{3} 3k$
- $\sum_{n=2}^{4} 4n - 1$
- $\sum_{n=1}^{10} 5$
- $\sum_{i=1}^{4} 5 - 3i$
- $\sum_{n=1}^{2} 8n$

iv. Calculate the following summations:

Remember: $S_n = \frac{1}{2}n\big(2a + (n-1)d\big)$

- S_4 for $u_n = 4 + (n-1)3$
- S_6 for $u_n = 5 + (n-1)5$
- S_{10} for $u_n = 4(n-1) + 10$
- S_8 for $u_n = 5 - 2(n-1)$
- S_5 for $u_n = 3 + (n-1)$
- S_{20} for $u_n = n$
- S_5 for $u_n = 3 - 2(n-1)$
- S_7 for $u_n = 8(n-1) + 12$