

COT 3100 Fall 2017 Homework #5
Please Consult WebCourses for the due date/time

1) Use mathematical induction on n to prove the following assertion for all positive integers n : $\sum_{i=1}^n \frac{i(i+1)}{2} = \frac{n(n+1)(n+2)}{6}$.

2) Use induction on n to prove that $4^{2n} - 15n - 1$ is divisible by 225 for all non-negative integers n .

3) Use induction to show that $\begin{pmatrix} 1 & 0 \\ -1 & 2 \end{pmatrix}^n = \begin{pmatrix} 1 & 0 \\ -2^n + 1 & 2^n \end{pmatrix}$ for all positive integers n .

4) Let H_n denote the n^{th} Harmonic number. Use mathematical induction on n to show that $H_{2^n} \geq 1 + \frac{n}{2}$, for all non-negative integers n .

5) Give a summary of the life and mathematical contributions of Carl Friedrich Gauss. Please aim for a length of roughly 200 - 400 words. **Your summary must be typed.** Please state the sources you used in writing your summary.