Name:
Directions: Solve the following problems. Give supporting work/justification where appropriate.

1. [2 points] How many subsets of $\{1,2, \ldots, 9\}$ have size 4 ? Give a numerical answer.
2. [4 points] Prove that $\sqrt{5}$ is irrational. You may use that if $a \in \mathbb{Z}$ and $5 \mid a^{2}$, then $5 \mid a$.
3. [4 points] Use a proof by contradiction to show that if $n \in \mathbb{Z}$, then $4 \nmid n^{2}+2$.
