

Instructions: Show all work. Use exact answers unless specifically asked to round. Answer all parts of each question.

1. Find the sum of $\sum_{i=0}^4 \frac{(-1)^i}{i!}$.

2. Use mathematical induction to prove that $\sum_{i=1}^n (4i - 1) = n(2n + 1)$.

3. Use the binomial theorem to expand $(x^2 - y)^4$.