Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Find the first three partial sums of the series $\sum_{n=1}^{\infty} \frac{1}{n^2}$.

2. Find the sum of the series $2 - \frac{1}{2} + \frac{1}{8} - \frac{1}{32} + \frac{1}{128} - \dots$