Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Use one of the criteria of Section 8.1 to determine whether the sequence $\{n^2 e^{-n}\}_{n=1}^{\infty}$ converges or diverges. If it converges, find the limit. All steps and explanations are required.

2. Use one of the criteria of Section 8.1 to determine whether the sequence $a_n = \dfrac{\cos^2 n}{2^n}$ converges or diverges. If it converges, find the limit. All steps and explanations are required.