Q1: Find whether the series is diverge or converge.

$i)$ $\sum_{k=1}^{\infty} k^2 . e^{-k}$ $ii)$ $\sum_{k=1}^{\infty} \frac{\ln k}{k^2}$

Question 2: Find the area of the shaded region along the following axis and verify your answer.
 	
    (a) along x-axis
    (b) along y-axis	