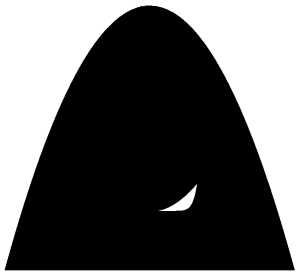
(30 pts)

(a) Find the centroid of the lamina pictured below with outer edge bounded by $y = -x^2 + 9$ and the x-axis and a hole in it bounded by $y = x^2 + 2$ and $y = x^{11} + 2$.



(b) Determine the condition under which putting a hole (of any shape) in a lamina leaves the centroid unchanged. Prove your answer.