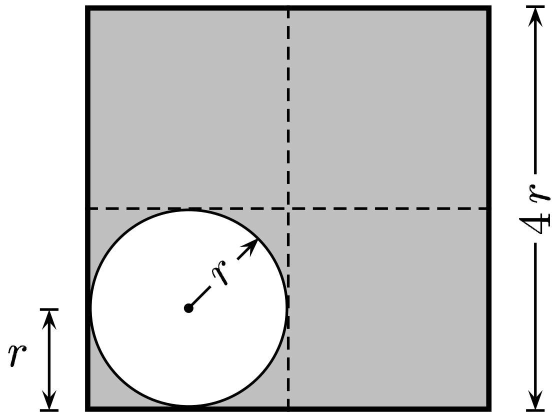

Consider the geometry of a circular hole in a square. By inspection determine the location where the center of mass of the object is located.

Locate the coordinate system at the center of the square.

A) $(x_c, y_c) = \left(\frac{(4\,r)^2\,(0) + (\pi\,r^2)\,(-r)}{(4\,r)^2 + \pi\,r^2}, \frac{(4\,r)^2\,(0) + (\pi\,r^2)\,(-r)}{(4\,r)^2 + \pi\,r^2}\right)$.

B) $(x_c, y_c) = \left(\frac{(4\,r)^2\,(0) + (-\pi\,r^2)\,(-r)}{(4\,r)^2 + \pi\,r^2}, \frac{(4\,r)^2\,(0) + (-\pi\,r^2)\,(-r)}{(4\,r)^2 + \pi\,r^2}\right)$.

C) $(x_c, y_c) = \left(\frac{(4\,r)^2\,(0) + (\pi\,r^2)\,(-r)}{(4\,r)^2 - \pi\,r^2}, \frac{(4\,r)^2\,(0) + (\pi\,r^2)\,(-r)}{(4\,r)^2 - \pi\,r^2}\right)$.

D) $(x_c, y_c) = \left(\frac{(4\,r)^2\,(0) + (-\pi\,r^2)\,(-r)}{(4\,r)^2 - \pi\,r^2}, \frac{(4\,r)^2\,(0) + (-\pi\,r^2)\,(-r)}{(4\,r)^2 - \pi\,r^2}\right)$.

Think of the hole as having negative mass, therefore

$$x_c = \frac{(4\,r)^2\,(0) + (-\pi\,r^2)\,(-r)}{(4\,r)^2 - \pi\,r^2} = \frac{(4\,r)^2\,(0) + (\pi\,r^2)\,(r)}{(4\,r)^2 - \pi\,r^2} \,.$$

The same is true for y_c.

Answer **D**.