

NAME: _____

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Quiz 5 - take home - Due Tue. Mar. 30

MAC 2313 - Spring 2010

1. (8 pts) Suppose that a gaseous spherical star of radius a has density function $\delta = k(1 - \frac{\rho^2}{a^2})$, so its density varies from $\delta = k$ at its center to $\delta = 0$ at its boundary $\rho = a$. Show that its mass is $\frac{2}{5}$ that of a similar star with uniform density k .

2. (12 pts) (a) Use integrals to find the coordinates (\bar{x}, \bar{y}) of the centroid G of the triangular region with vertices $(0, 0)$, $(a, 0)$, (b, c) . (By choosing the coordinate system appropriately, any triangle can be assumed like this.)

(b) Use vectors and your result in part (a), to show that the centroid G is on each median of the triangle and divides each median in a ratio of 2:1. (A median in a triangle is the line-segment that joins a vertex to the midpoint of the opposite side.) Thus, you proved that the three medians of a triangle intersect at the centroid of the triangle.