MATH 202, Fall 2023 **Name:** _____
In class work 4 **Row and Seat**: _____

In class work **4** has questions **1** through **1** with a total of **6** points. Turn in your work at the end of class *on paper*. This assignment is due *Tuesday 5 September 13:20*.

1. Define a region Q of the xy plane by $Q = \{(x, y) \mid 0 \leq y \leq 1 - |x|, -1 \leq x \leq 1\}$.

[1] (a) Sketch the region Q in the xy plane.

[2] (b) Make a conjecture about the location of the centroid of Q. Of course $\overline{x} \leq 107$ and $\overline{y} \leq 107$ is a conjecture, but try for something more specific.

[1] (c) Use junior high math (no calculus) to find area(Q).

1 (d) Solve $M\overline{x} = \int_{-1}^{1} x(1-|x|)\,\mathrm{d}x$, where M is the area of Q, for $\overline{x}$. To evaluate the definite integral $\int_{-1}^{1} x(1-|x|)\,\mathrm{d}x$, use a fact about the integral of an odd function over a symmetric interval.

1 (e) Solve $M\overline{y} = \frac{1}{2}\int_{-1}^{1}(1-|x|)^2\,\mathrm{d}x$, where M is the area of Q, for $\overline{y}$. To do this, use the fun fact that $\displaystyle\int |x|\,\mathrm{d}x = \frac{1}{2}x|x|$.