Name: _____

Instructions. Solve the problems on a SEPARATE piece of paper and write up the final solution on THIS piece of paper. Show work clearly. Feel free to collaborate with your classmates, but all solutions turned in should be your own work.

Problem 1

Let C be the area in the xy-plane bounded below by the x-axis and above by the graph of the function $f(x) = \sqrt{4 - x^2}$. Write a *definite integral* expression for C and then compute C. (Hint: It may be helpful to draw the described region in order to figure out what the limits of integration are.)

Problem 2

Consider the functions $g(x) = \dfrac{1}{x^2}$ and $h(x) = \dfrac{1}{x}$. Your task is to interpret the following expressions:

$$\lim_{b \to \infty} \int_1^b g(x) \ dx \qquad \text{and} \qquad \lim_{b \to \infty} \int_1^b h(x) \ dx.$$

In particular, you should determine if each limit exists and describe a geometric region whose area corresponds to each expression. A well-labelled picture can serve as the description of the geometric region. (Label all relevant lines, curves, and points)