If $y = \frac{1}{3}x^3$ find the **exact value** of $\frac{dy}{dx}$ when $x = 39$.

Let C denote the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} = 1$. Let P denote a point on the curve C in the first quadrant. Let L denote the normal line to the curve C at the point P. If L passes through the point $\left(\frac{1}{2}, 0\right)$ find the gradient of the line L. Give your answer correct to two decimal places.

Let a denote a positive constant. Let R denote the part of the region in the first quadrant which is bounded above by the curve $y = \sqrt{(a-x)(2a-x)(3a-x)}$ and bounded below by the x-axis from $x = 2a$ to $x = 3a$. If the volume of the solid obtained by revolving R one complete round about the x-axis is equal to 2019, find the value of a. Give your answer correct to two decimal places.

Let a denote a positive constant. If the area under the curve $y = x\sqrt{2ax - x^2}$ from $x = 0$ to $x = a$ is equal to 888, find the value of a. Give your answer correct to two decimal places.