

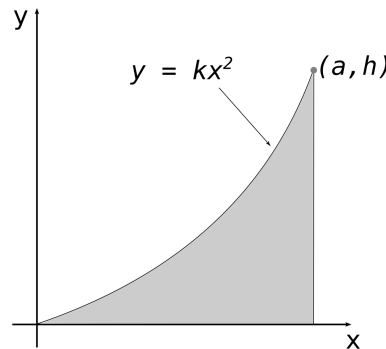
Name: _____ Section: _____

AEM 2011 Quiz #7
Tuesday, March 14, 2023

A non-communicating calculator is allowed. Full credit will only be given if all steps used are clearly communicated (free body diagrams, algebra, etc).

Use direct integration to find the centroid of the area shown in terms of a and h .

Hint: given a point on the curve, it should be possible to find k .



$$h = ka^2$$
$$k = \frac{h}{a^2}$$

$$A = \frac{ka^3}{3}$$
$$= \frac{ha}{3}$$

$$\bar{X} = \frac{\int x dA}{A} = \frac{\int_0^a kx^3 dx}{\int_0^a kx^2 dx} = \frac{\frac{kx^4}{4} \Big|_0^a}{\frac{kx^3}{3} \Big|_0^a} = \frac{3a}{4}$$

$$\bar{Y} = \frac{\frac{1}{2} \int y dA}{A} = \frac{\frac{1}{2} \int_0^a k^2 x^4 dx}{\int_0^a kx^2 dx} = \frac{\frac{k^2 x^5}{10} \Big|_0^a}{\frac{kx^3}{3} \Big|_0^a} = \frac{3ka^2}{10} = \frac{3h}{10}$$