

$$\int_0^a \frac{bx^{3/2}}{\sqrt{a}} dx - \int_0^a \frac{b}{a} x^2 dx = \frac{b}{\sqrt{a}} \frac{x^{5/2}}{5/2} \Big|_0^a - \frac{b}{a} \frac{x^3}{3} \Big|_0^a$$

$$= \frac{2ba^2}{5} - \frac{ba^2}{3} = \frac{6ba^2 - 5ba^2}{15} = \frac{ba^2}{15}$$

$$\bar{x} \cdot A = \int \bar{x} \, dA \Rightarrow \bar{x} = \frac{ba^2}{15} \cdot \frac{6}{ab}$$

$$\boxed{\bar{x} = \frac{2a}{5}}$$

$$\bar{y} \cdot A = \int \bar{y} \, dA = \int \left( \frac{bx^{1/2}}{2\sqrt{a}} + \frac{bx}{2a} \right) \cdot \left( \frac{bx^{1/2}}{\sqrt{a}} - \frac{bx}{a} \right) dx$$

$$= \int \left[ \frac{b^2 x}{2a} - \frac{b^2 x^{3/2}}{2a\sqrt{a}} + \frac{b^2 x^{3/2}}{2a\sqrt{a}} - \frac{b^2 x^2}{2a^2} \right] dx$$

$$= \int_0^a \frac{b^2 x}{2a} dx - \int_0^a \frac{b^2 x^2}{2a^2} dx$$

$$\bar{y} \cdot A = \frac{b^2 a^2}{4a} - \frac{b^2 a^3}{6a^2} = \frac{ab^2}{4} - \frac{ab^2}{6} = \frac{3ab^2 - 2ab^2}{12} = \frac{ab^2}{12}$$

$$\bar{y} = \frac{ab^2}{12} \cdot \frac{6}{ab} \Rightarrow \boxed{\bar{y} = \frac{b}{2}}$$