GRAPH
ABOVE

GRAPH
BELOW

$$\int_a^b (\text{GRAPH ABOVE}) - (\text{GRAPH BELOW}) \ dx$$

1. FIND POINT(S) OF INTERSECTION

$$\sqrt{x} = x^3$$

$$(\sqrt{x})^2 = (x^3)^2$$

$$x = x^6$$

$$0 = x^6 - x$$

$$0 = x(x^5 - 1)$$

$\boxed{x = 0}$ $x^5 - 1 = 0$

$$x^5 = 1$$

$$\left(x^{\frac{5}{1}}\right)^{\frac{1}{5}} = 1^{\frac{1}{5}}$$

$$\boxed{x = 1}$$

$$\int_0^1 (\text{GRAPH ABOVE}) - (\text{GRAPH BELOW}) \ dx$$

$$= \int_0^1 \left(\sqrt{x} - x^3\right) dx$$

$$= \int_0^1 \left(x^{\frac{1}{2}} - x^3\right) dx$$

$$= \left[\frac{x^{1/2+1}}{1/2+1} - \frac{1}{4}x^4\right]_0^1$$

$$= \left[\frac{x^{3/2}}{\frac{3}{2}} - \frac{1}{4}x^4\right]_0^1$$

$$= \left[\frac{2}{3}x^{3/2} - \frac{1}{4}x^4\right]_0^1$$

$$= \left(\frac{2}{3}(1)^{3/2} - \frac{1}{4}(1)^4\right) - \left(\frac{2}{3}(0)^{3/2} - \frac{1}{4}(0)^4\right)$$

$$= \frac{2}{3} - \frac{1}{4}$$

$$= \frac{8}{12} - \frac{3}{12}$$

$$= \boxed{\frac{5}{12}}$$