

$$M = \int_a^b \rho (f(x) - g(x)) dx$$

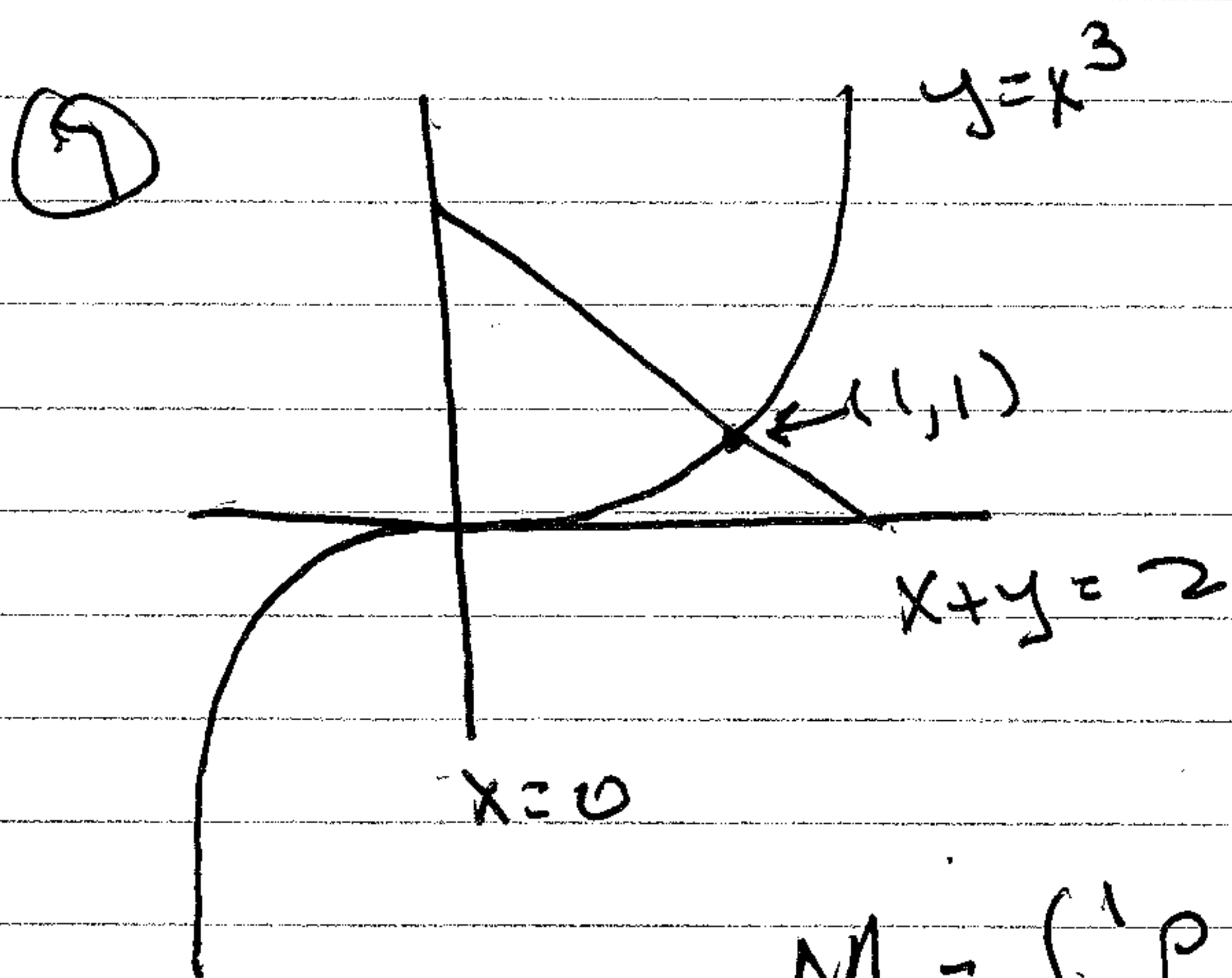
$$M_y = \int_a^b \rho x (f(x) - g(x)) dx$$

$$M_x = \int_a^b \rho \frac{f(x) + g(x)}{2} (f(x) - g(x)) dx$$

$$= \int_a^b \frac{\rho}{2} (f(x)^2 - g(x)^2) dx$$

$$\bar{x} = \frac{M_y}{M}$$

$$\bar{y} = \frac{M_x}{M}$$



$$x^3 + y = 2$$

$$x^3 + x - 1 = 0$$

$$(x-1)(x^2 + x + 1) = 0$$

$$(x-1)(x^2 + x + 2) = 0$$

$$x-1=0$$

$$x=1$$

$$M = \int_0^1 \rho [2 - x - x^3] dx = \rho [2x - \frac{1}{2}x^2 - \frac{1}{4}x^4] \Big|_0^1$$

$$= \rho (2 - \frac{1}{2} - \frac{1}{4}) = \frac{5}{4}\rho$$

$$M_y = \int_0^1 \rho x [2 - x - x^3] dx = \int_0^1 \rho [2x - x^2 - x^4] dx$$

$$= \rho [x^2 - \frac{1}{3}x^3 - \frac{1}{5}x^5] \Big|_0^1 = \rho [1 - \frac{1}{3} - \frac{1}{5}] = \rho \frac{7}{15}$$

$$M_x = \int_0^1 \frac{\rho}{2} [(2-x)^2 - x^6] dx = \frac{\rho}{2} [-\frac{1}{3}(2-x)^3 - \frac{1}{7}x^6] \Big|_0^1$$

$$= \frac{\rho}{2} [-\frac{1}{3} - \frac{1}{7} + \frac{1}{3}8] - \frac{\rho}{2} [\frac{7}{3} - \frac{1}{7}] = \frac{\rho}{2} [\frac{46}{3(7)}]$$

$$= \rho \frac{23}{21}$$

$$\bar{x} = \frac{M_y}{M} = \frac{\rho \frac{7}{15}}{\rho \frac{5}{4}} = \frac{7}{15} \cdot \frac{4}{5} = \frac{28}{75}$$

$$\bar{y} = \frac{M_x}{M} = \frac{\frac{23}{21}}{\frac{5}{4}} = \frac{23}{21} \cdot \frac{4}{5} = \frac{92}{105}$$