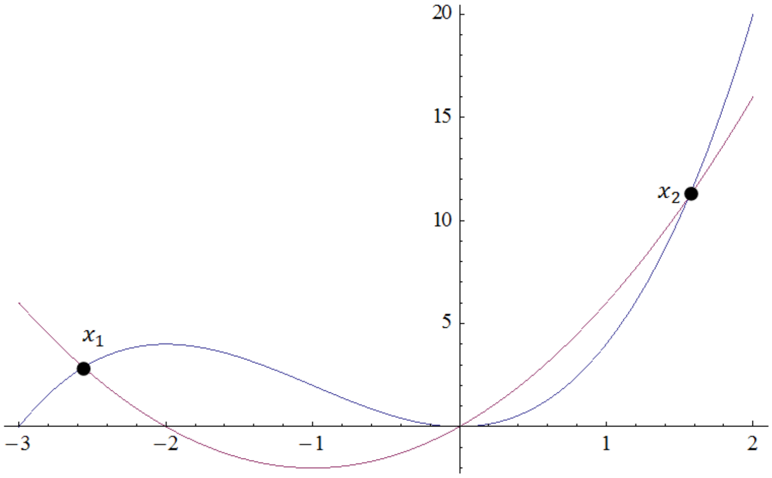
find the area bounded by y=x^3+3x^2 and y=2x^2+4x

$If\ we\ must\ to\ find\ the\ area\ S\ \ that\ is\ bounded\ by\ y_1(x)\ and\ y_2(x)\ we\ use\ the\ formula:$

$$S = \int_{x_1}^{x_2} (y_2(x) - y_1(x))\ dx, where\ \ x_1\ and\ x_2\ are\ the\ point\ of\ intersection\ of\ y_2(x)\ and\ y_1(x)$$

$y_1(x) = x^3 + 3x^2$
$y_2(x) = 2x^2 + 4x$



$x^3 + 3x^2 = 2x^2 + 4x$

$x_1 = \frac{1}{2}(-1 - \sqrt{17})$
$x_2 = \frac{1}{2}(-1 + \sqrt{17})$

$x_3 = 0$

$$S = \int_{\frac{1}{2}(-1-\sqrt{17})}^{0} (x^3 + 3x^2 - 2x^2 - 4x)dx + \int_{0}^{\frac{1}{2}(-1+\sqrt{17})} (2x^2 + 4x - x^3 - 3x^2)dx =$$

$$\int_{\frac{1}{2}(-1-\sqrt{17})}^{0} (x^3 + x^2 - 4x)dx + \int_{0}^{\frac{1}{2}(-1+\sqrt{17})} (4x - x^3 - x^2)dx =$$

$$= \left(\frac{x^4}{4} + \frac{x^3}{3} - \frac{4x^2}{2}\right)\Big|_{\frac{1}{2}(-1-\sqrt{17})}^{0} + \left(\frac{4x^2}{2} - \frac{x^4}{4} - \frac{x^3}{3}\right)\Big|_{0}^{\frac{1}{2}(-1+\sqrt{17})} = \frac{121}{12}$$