

Integration

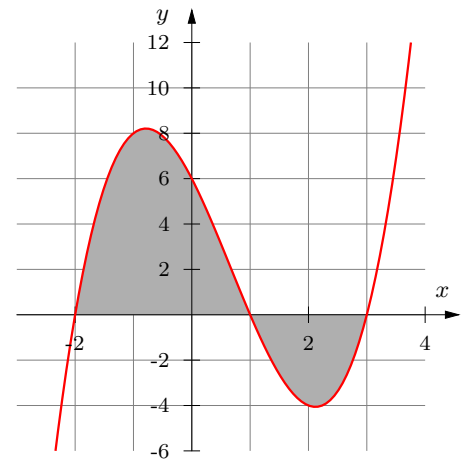


i. Evaluate the following definite integrals:

- $\int_0^2 x^3 - 2x^2 + 1 \, dx$
- $\int_{-1}^1 \frac{1}{x^2} \, dx$
- $\int_3^5 \sqrt{x} \, dx$
- $\int_1^2 \frac{x^3 + 4x^2 + 3x}{x} \, dx$
- $\int_0^2 \frac{(x+1)(x-2)\sqrt{x}}{3} \, dx$

ii. The image, right, shows the plot of the curve $y = x^3 - 2x^2 - 5x + 6$.

- Given that $(x + 2)$ is factor of y , fully factorise y .
- Hence, calculate the area of the shaded region using calculus.



iii. The image, right, shows the curves $y = \sqrt{x}$ (in red) and $y = \frac{1}{2}x$ (in purple).

- Use algebra to verify that the lines intersect at $(0, 0)$ and $(4, 2)$.
- Hence, calculate the area of the shaded region.

