

1. Evaluate the following integral or show that it diverges.

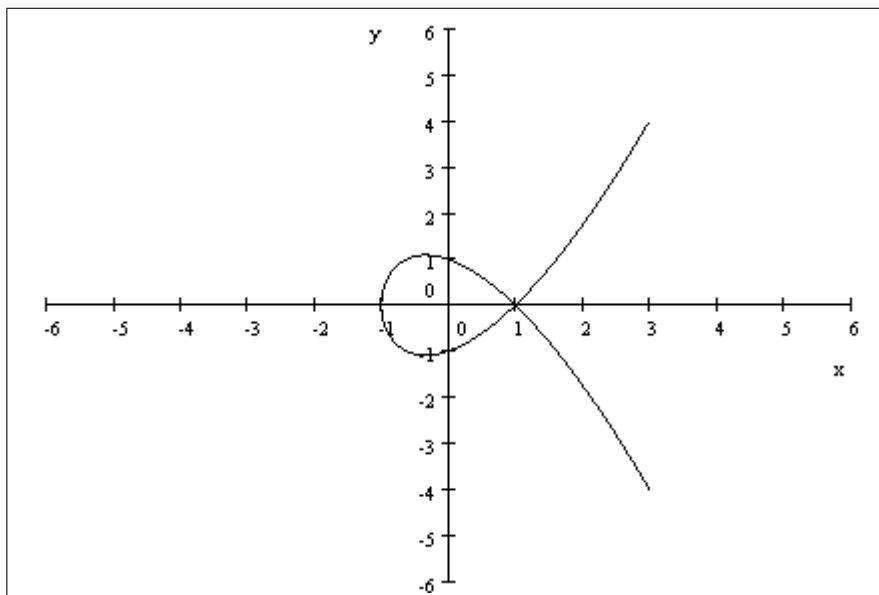
$$\int_{x=-1}^{x=1} \frac{1}{x^4} dx$$

$$\begin{aligned} \int_{x=-1}^{x=1} \frac{1}{x^4} dx &= \int_{x=-1}^{x=0} \frac{1}{x^4} dx + \int_{x=0}^{x=1} \frac{1}{x^4} dx \\ &= \lim_{t \rightarrow 0^-} \int_{x=-1}^{x=t} \frac{1}{x^4} dx + \lim_{t \rightarrow 0^+} \int_{x=t}^{x=1} \frac{1}{x^4} dx \\ &= \lim_{t \rightarrow 0^-} \left(-\frac{1}{3x^3} \right)_{x=-1}^{x=t} + \lim_{t \rightarrow 0^+} \left(-\frac{1}{3x^3} \right)_{x=t}^{x=1} \\ &= \lim_{t \rightarrow 0^-} \left(-\frac{1}{3t^3} - \frac{1}{3} \right) + \lim_{t \rightarrow 0^+} \left(-\frac{1}{3} + \frac{1}{3t^3} \right) \end{aligned}$$

Since the first limit does not exist, the integral diverges.

2. Make a careful sketch (on xy -axes) of the given parametric curve by plotting points. Indicate with arrows the direction traced out on the curve as t increases.

(a) $x = t^2 - 1, y = t^3 - 2t, -2 \leq t \leq 2$



(b) $x = 2 \cos t, y = 5 \sin t, \frac{\pi}{2} \leq t \leq \pi$

