1. Solve the initial value problem in \( \frac{dy}{dx} = \frac{1}{\sqrt{x}} \); \( y(1) = 1 \).

2. First calculate (in terms of \( n \)) the sum
\[
\sum_{i=1}^{n} f(x_i) \Delta x
\]
to approximate the area \( A \) of the region under \( f(x) = x^3 \) above the interval \([0, 3]\). Then find \( A \) exactly by taking the limit as \( n \to \infty \).
3. Find the limit of \( \lim_{x \to \pi} \frac{1 + \cos x}{(x - \pi)^2} \).

4. Find the limit of \( \lim_{x \to 0} \left( \frac{1}{x^2} - \frac{1}{1 - \cos x} \right) \).
5. Sketch the graph of $f(x) = \frac{x^3}{x^2 - 1}$ indicating all critical points, inflection points, and asymptotes. Show the concave structure clearly.

6. Sketch the graph of $f(x) = x^4 - 12x^2$ indicating all critical points, inflection points, and asymptotes. Show the concave structure clearly.
7. Match the graph of each function in (a)-(f) with the graph of its second derivative in I-VI.