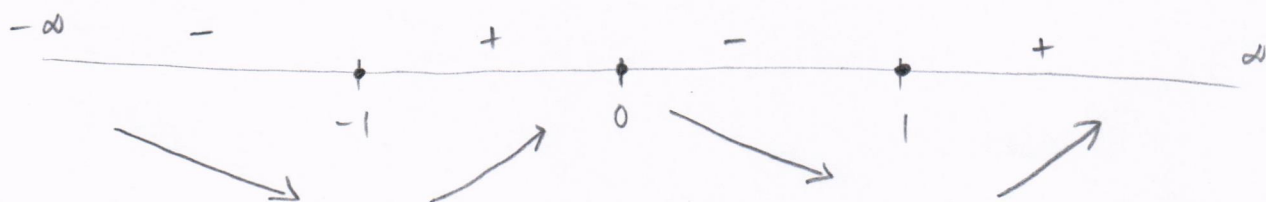


Key . (10)

1. Determine where the function $y = x^4 - 2x^2$ is increasing or decreasing and find the relative max and min if any

$$\begin{aligned} y' &= 4x^3 - 4x \\ &= 4x(x^2 - 1) \\ &= 4x(x+1)(x-1) \end{aligned}$$

$$y' = 0 \quad \text{at} \quad x = 0 \quad \text{or} \quad x = 1 \quad \text{or} \quad x = -1$$



- The function is decreasing on the intervals $(-\infty, -1)$ and $(0, 1)$
- The function is increasing on the intervals $(-1, 0)$ and $(1, \infty)$

• -1 and 1 are relative minimums

• 0 is a relative maximum

2. Find y' if $y = x^{x^2+1}$ (please write $y' = \dots$)

$$\ln y = (x^2+1) \ln x$$

$$\frac{y'}{y} = \frac{x^2+1}{x} + \ln x \times 2x$$

$$y' = \left(\frac{x^2+1}{x} + 2x \ln x \right) x^{x^2+1}$$

$$y' = \left(x^{x^2+1} \right) \times \left(\frac{x^2+1}{x} + 2x \ln x \right)$$