1. Find the maximum and minimum values of the function $f(x) = 3x^4 - 4x^3$ with $-1 \le x \le 2$.

2. Find the critical points, the intervals of increase and decrease, and the local maxima and local minima of the function $f(x) = x \sin x + \cos x$ where $0 \le x \le 2\pi$.