
Mathematics – 1

For each of the functions below find local (relative) maxima, local (relative) minima, inflection points, global (absolute) maxima, and global (absolute) minima over the given intervals.

a) $f(x) = xe^x$, $-2 \leq x \leq 0$ (24 points)

b) $f(x) = x \sin x + \cos x$, $-\pi \leq x \leq \pi$ (24 points)

c) $f(x) = x^4 - x^3 - 3x^2 + 5x - 2$, $-1 \leq x \leq 2$ (24 points)

d) $f(x, y) = xy^2 + 2x + y^4 + 1$, $x^2 + y^2 \leq 1$ (28 points)

While you may make plots of the functions to help with your thinking, you must show and explain the analytical calculation of your answers in order to receive full credit.