1) Suppose $a > 0$ and $f(x) = \frac{1}{1 + |x + a|} + \frac{1}{1 + |x - a|}$.

   i) Find the intervals (if any) on which $f$ is increasing.

   ii) Find the intervals (if any) on which $f$ is decreasing.

   iii) Find the local extrema (if any) of $f$.

   iv) Find the absolute maximum and absolute minimum (if they exist) of $f$.

2) Show that for all $x$ and $y$, we have $|\sin x - \sin y| \leq |x - y|$.

3) Let $f(x) = x^2e^{-x}$. At which point does $f$ increase most rapidly?