

**Problem statement** Consider the functions given by the equation  $f_c(x) = (x^2 + c)e^x$ , where  $c$  is a parameter.

a) Use the calculator to observe the curves for the values  $c = 0, 1, 2$  when  $x$  is in the interval  $[-4, 1]$ . Do all three curves have the same number of horizontal tangents? Do all three curves have the same number of inflection points? You may have to *zoom* in to investigate this.

b) Use calculus to determine the location of all the inflection points of the graph of  $y = f_c(x)$ . Your answer may depend on  $c$ .

c) At what values of  $c$  does the number of inflection points change? What are the values of  $c$  (if any) for which there is exactly one inflection point?