

Series expansions & Linear Combinations  
(continued)

2. Linear independence

Example 1: are  $x$  &  $x^2$  linearly independent?

Start with  $c_1 x + c_2 x^2 = 0$  for every  $x$

and ask: does this mean that  $c_1 = c_2 = 0$ ?

$$\left. \begin{array}{l} \text{Set } x=1 \quad \text{then } c_1 + c_2 = 0 \\ \text{Set } x=-1 \quad \text{then } -c_1 + c_2 = 0 \end{array} \right\} \Rightarrow c_1 = c_2 = 0$$

Thus the 2 functions  $x$  &  $x^2$  are linearly independent.