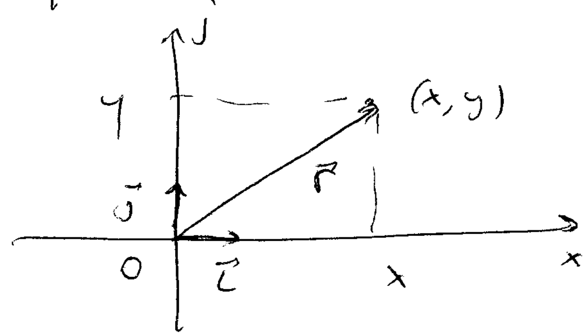
Series expansions & linear combinations (continued)

2. Expansions of functions onto other functions (continued)

Linear independence:

Why do we care?



$$\vec{r} = x\,\vec{i} + y\,\vec{j}$$

Assume that $\vec{i}$ & $\vec{j}$ are not linearly independent
Then there is a c_1 & c_2 such that

$$c_1\vec{i} + c_2\vec{j} = \vec{0} \quad \text{with } c_1, c_2 \neq 0$$

Combine this with

$$\vec{r} = x\vec{i} + y\vec{j}$$
$$\vec{0} = c_1\vec{i} + c_2\vec{j}$$
$$\Rightarrow \vec{r} = (x + c_1)\vec{i} + (y + c_2)\vec{j}$$

If c_1 or c_2 is not 0, then there would be a single point with 2 sets of coordinates: (x, y) and $(x + c_1, y + c_2)$.

Of course, what this means is that we want $\vec{i}$ & $\vec{j}$ linearly independent.