

# MTH 225/225

## Quiz #1

1. Suppose  $u, v, w \in V$  are vectors in a vector space  $V$ . Write down the definition of what it means for  $u, v, w$  to be linearly independent.

The only solution to the equation  
$$c_1 u + c_2 v + c_3 w = 0$$
is  $c_1 = c_2 = c_3 = 0$ .

2. Are the functions  $x^2 + x + 2$ ,  $x^2 + 2x + 1$ ,  $2x^2 + 5x + 1$  linearly dependent or independent. You must show your work to receive full credit, but you do not need to be verbose.

$$c_1(x^2 + x + 2) + c_2(x^2 + 2x + 1) + c_3(2x^2 + 5x + 1) = 0$$

$$\Rightarrow c_1 + c_2 + 2c_3 = 0$$

$$c_1 + 2c_2 + 5c_3 = 0$$

$$2c_1 + c_2 + c_3 = 0$$

$$\Rightarrow \left[ \begin{array}{ccc|c} 1 & 1 & 2 & 0 \\ 1 & 2 & 5 & 0 \\ 2 & 1 & 1 & 0 \end{array} \right] \begin{array}{l} -R1 \\ -2R1 \end{array} \Rightarrow \left[ \begin{array}{ccc|c} 1 & 1 & 2 & 0 \\ 0 & 1 & 3 & 0 \\ 0 & -1 & -3 & 0 \end{array} \right] \Rightarrow \left[ \begin{array}{ccc|c} 1 & 1 & 2 & 0 \\ 0 & 1 & 3 & 0 \\ 0 & 0 & 0 & 0 \end{array} \right]$$

Linearly dependent.