MA552. Quiz 5

A linear mapping f of R^3 into itself is defined by giving the coordinates (X, Y, Z) of the vector $f(u)$ as a function of the coordinates (x, y, z) of the vector u:

$$\begin{aligned} X &= (m-2)x + 2y - z \\ Y &= 2x + my + 2z \\ Z &= 2mx + 2(m+1)y + (m+1)z \end{aligned}$$

Show that the rank of f is equal to 3 except for particular values of m and determine these particular values. Find the ranks for these values and define the subspace $f(R^3)$.