(11.) $A = \begin{bmatrix} 1 & 2 & 3 & 0 & -2 \\ 0 & 0 & c & 2 & 2 \\ 0 & 0 & 0 & d & -2 \end{bmatrix}$ $B = \begin{bmatrix} d & c \\ c & d \end{bmatrix}$

for A to be rank 2 :

$c = 0$ and $d = -2$, which makes ~~columns~~

Rows 2 and 3 equal

if $c = 0$ and $d = -2$, (~~verif~~ verification of Rank 2)

$A = \begin{bmatrix} 1 & 2 & 3 & 0 & -2 \\ 0 & 0 & 0 & 2 & 2 \\ 0 & 0 & 0 & -2 & -2 \end{bmatrix}$

$rref(A) = \begin{bmatrix} 1 & 2 & 3 & 0 & -2 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

2 pivots, Rank = 2

$B = \begin{bmatrix} d & c \\ c & d \end{bmatrix}$ for rank 2, $\det(B) \neq 0$
(inverse (B) exists)

$d^2 - c^2 \neq 0$

$\Rightarrow c \neq d, \; c \neq -d$

$\Rightarrow c \neq \pm d$

Since both matrices A and B must have same values of c & d, we get

$\boxed{\begin{matrix} c = 0 \\ d = -2 \end{matrix}}$

Verification for B

$B = \begin{bmatrix} -2 & 0 \\ 0 & -2 \end{bmatrix}$ $rref(B) = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ $\Rightarrow$ 2 pivots

Rank = 2