Question 1 *True/False: Let A be a square matrix. If $\dim \operatorname{Nul} A = 0$ then A is invertible.*

Multiple Choice:

(a) *True* ✓

(b) *False*

Question 2 *True/False: Let A be an $n \times n$ matrix. If $\operatorname{rank} A = n$ then A is invertible.*

Multiple Choice:

(a) *True* ✓

(b) *False*

Question 3 *If A is a 3×5 matrix with a two-dimensional null space, what is the rank of A?*

$\operatorname{rank} A = \boxed{3}$

Question 4 *If A is a 2×3 matrix with $\dim \operatorname{Col} A = 3$, what is $\dim \operatorname{Nul} A$?*

$\dim \operatorname{Nul} A = \boxed{0}$

Question 5 *If A is a 8×7 matrix with $\dim \operatorname{Col} A = 3$, what is the rank of A?*

$\operatorname{rank} A = \boxed{3}$

Hint: $\operatorname{rank} A = \dim \operatorname{Col} A$

Question 6 *If A is a 8×7 matrix with $\dim \operatorname{Col} A = 3$, what is the rank of A?*

$\operatorname{rank} A = \boxed{3}$

Hint: $\operatorname{rank} A = \dim \operatorname{Col} A$

Question 7 *A and B below are row equivalent. Determine the following values.*

$$A = \begin{bmatrix} 1 & -1 & 2 & 3 & 1 & 0 \\ 0 & 5 & -2 & 1 & 1 & 1 \\ -3 & 3 & -6 & -9 & -3 & 0 \\ -1 & 1 & 2 & 1 & -2 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & -1 & 2 & 3 & 1 & 0 \\ 0 & 5 & -2 & 1 & 1 & 1 \\ 0 & 0 & 4 & 4 & -1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$\operatorname{rank} A = \boxed{3}$
$\dim \operatorname{Nul} A = \boxed{3}$

A basis for $\operatorname{Col} A$ *is* $\left\{ \begin{bmatrix} \boxed{1} \\ \boxed{0} \\ \boxed{-3} \\ \boxed{-1} \end{bmatrix}, \begin{bmatrix} \boxed{-1} \\ \boxed{5} \\ \boxed{3} \\ \boxed{1} \end{bmatrix}, \begin{bmatrix} \boxed{2} \\ \boxed{-2} \\ \boxed{-6} \\ \boxed{2} \end{bmatrix} \right\}$
