6. [4 pts] Suppose you know that $\vec{w}$ is in $\ker(B)$, and you also know that $B\vec{v} = \begin{pmatrix}1\\2\\3\end{pmatrix}$. Use this information to find $B(3\vec{w} - 2\vec{v})$.

4

$B\vec{w} = \vec{0} \qquad B\vec{v} = \begin{pmatrix}1\\2\\3\end{pmatrix}$

$B(3\vec{w} - 2\vec{v}) = 3(B\vec{w}) - 2(B\vec{v})$

$= \vec{0} - 2\begin{pmatrix}1\\2\\3\end{pmatrix} = \begin{pmatrix}-2\\-4\\-6\end{pmatrix}$

6

7. True or false (circle your answer; no justification needed). In all of the problems below, A is an nxn *square* matrix.

(a) [2 pts] If A is the coefficient matrix for some linear system, and $\text{rank}(A) = n$, then the system has a unique solution.

TRUE FALSE

(b) [2 pts] If A is the coefficient matrix for some linear system, and $\text{rank}(A) < n$, then the system must have infinitely many solutions.

$n = 3$

TRUE FALSE

or no solution $\begin{pmatrix}0&1&0\\0&0&1\\0&0&0\end{pmatrix} \quad \begin{pmatrix}1&0&0\\0&1&0\\0&0&0\end{pmatrix}$

(c) [2 pts] If A is the coefficient matrix for some linear system, and the system had a unique solution, then the RREF of A must be precisely the identity matrix $I_n = \begin{pmatrix}1&0&0&\cdots&0\\0&1&0&&0\\0&0&1&&0\\\vdots&&&\ddots&\\0&0&0&\cdots&1\end{pmatrix}$.

TRUE FALSE