Name: —————————————   R. Hammack   Score: ————

Directions: Please answer all questions in the space provided. Use of calculators or any form of electronic commu-
nication device is strictly forbidden on this quiz.

1. Suppose A, B and C are 3×3 matrices for which $|A| = 3$, $|B| = 5$ and $|2AB^{-1}C| = 6$. Find $|C|$.

$$
\begin{aligned}
|2AB^{-1}C| &= 6 \\
2^3|AB^{-1}C| &= 6 \\
8|A||B^{-1}||C| &= 6 \\
\frac{8|A||C|}{|B|} &= 6 \\
\frac{8 \cdot 3 \cdot |C|}{5} &= 6 \\
|C| &= \frac{5 \cdot 6}{24} = \frac{5}{4}
\end{aligned}
$$

Answer: $|C| = \frac{5}{4}$.

2. Find the value(s) of k for which the matrix $\begin{bmatrix} 1 & 0 & 5 \\ 2 & 2 & 0 \\ 6 & 5 & k \end{bmatrix}$ is **not** invertible.

Let's calculate the determinant by expanding along the third column:

$$
\begin{vmatrix} 1 & 0 & 5 \\ 2 & 2 & 0 \\ 6 & 5 & k \end{vmatrix} = 5 \begin{vmatrix} 2 & 2 \\ 6 & 5 \end{vmatrix} + k \begin{vmatrix} 1 & 0 \\ 2 & 2 \end{vmatrix} = 5 \cdot (-2) + 2k = -10 + 2k
$$

Thus the determinant is $2k - 10$, and this can only be zero if $k = 5$.

Answer: the matrix is not invertible if $k = 5$. If k has any other value, the matrix is invertible.