Math 1553, Quiz 6 (3.5-3.6, Ch. 4), Fall '25, Version A

Name	Key	GT ID	

Write your studio section below. It is a letter followed by a number (for example, A1).

- The quiz is worth 3 points. Only answers are graded, and there is no partial credit.
- For questions with bubbles, either fill in the bubble completely or leave it blank. **Do not** mark any bubble with "X" or "/" or any such intermediate marking. Anything other than a blank or filled bubble may result in a 0 on the problem, and regrade requests may be rejected without consideration.

1. (0.5 points each) True or false. If the statement is ever false, fill in the bubble for False.

   (a) If A and B are invertible $n \times n$ matrices, then $(AB)^{-1} = A^{-1}B^{-1}$.

   ○ True

   ● False

   $(AB)^{-1} = B^{-1}A^{-1}$

   (b) If A is a 3×3 matrix whose first column is the sum of its second and third columns, then $\det(A) = 0$.

   ● True

   ○ False

   A not invertible so $\det(A) = 0$.

2. (0.25 points each) Suppose A is an $n \times n$ matrix. Which of the following statements must be true? Fill in the bubble for all that apply.

   ○ If $\det(A) = 2$, then $\det(3A) = 6$.

   ● If there is a vector b in $\mathbf{R}^n$ so that $Ax = b$ has exactly one solution, then A must be invertible. (this implies $A\vec{x} = \vec{0}$ also has exactly one solution by the theory of 2.4, so A is invertible by IMT)

   ● If A is invertible, then A^3 must also be invertible.

   ● If the equation $Ax = 0$ has only the trivial solution, then A must be invertible.

(Problem 3 is on the back side)

3. (1 point) Suppose $\det \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix} = 1.$

Find $\det \begin{pmatrix} 5a+2d & 5b+2e & 5c+2f \\ a & b & c \\ g & h & i \end{pmatrix}$. Fill in the bubble for your answer below.

- ○ 1/2
- ○ −1/2
- ○ 1/5
- ○ −1/5
- ○ 1/10
- ○ −1/10
- ○ 1
- ○ −1
- ○ 2
- ● −2
- ○ 5
- ○ −5
- ○ 10
- ○ −10
- ○ none of these

$$\begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$$

$$\xrightarrow{R_1 \leftrightarrow R_2} \begin{pmatrix} d & e & f \\ a & b & c \\ g & h & i \end{pmatrix}$$ new det is -1

$$\xrightarrow{R_1 = 2R_1} \begin{pmatrix} 2d & 2e & 2f \\ a & b & c \\ g & h & i \end{pmatrix}$$ new det is -2

$$\xrightarrow{R_1 = R_1 + 5R_2} \begin{pmatrix} 5a+2d & 5b+2e & 5c+2f \\ a & b & c \\ g & h & i \end{pmatrix}$$

det is still -2