

MATH 2242-090 — Spring 2016 — Dr. Clontz — Quiz 1
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Name: \_\_\_\_\_

- Each quiz question is labeled with its worth toward your total quiz grade for the semester.
- On multiple choice problems, you do not need to show your work. No partial credit will be given.
- On full response problems, show all of your work and give a complete solution. When in doubt, don't skip any steps. Partial credit will be given at the discretion of the professor.
- This quiz is open notes and open book.
- This quiz is due at the end of class. Quizzes submitted over one minute late will be penalized by 50%.

1. (10 points) Recall from the homework that  $\det(AB) = (\det A)(\det B)$ . Evaluate

$$\det \left( \begin{bmatrix} 1 & 1 \\ -3 & 2 \end{bmatrix} \begin{bmatrix} 3 & -1 \\ 2 & 0 \end{bmatrix} \right)$$

- ☐ -9
  - ☐ 0
  - ☐ 6
  - ☐ 10
  - ☐ None of these
2. (10 points) Verify the triangle inequality  $\|\mathbf{x} + \mathbf{y}\| \leq \|\mathbf{x}\| + \|\mathbf{y}\|$  for  $\mathbf{x} = (1, -2, 0, 2)$ ,  $\mathbf{y} = (0, 4, -3, 0)$ .

3. (10 points) Use the “identity of Lagrange”

$$\left(\sum_{i=1}^n x_i y_i\right)^2 = \left(\sum_{i=1}^n x_i^2\right) \left(\sum_{i=1}^n y_i^2\right) - \sum_{1 \leq i < j \leq n} (x_i y_j - x_j y_i)^2$$

to prove the Cauchy-Schwarz inequality  $|\mathbf{x} \cdot \mathbf{y}| \leq \|\mathbf{x}\| \|\mathbf{y}\|$  in  $\mathbb{R}^n$ . (Hint: the identity of Lagrange involves the terms  $\|\mathbf{x}\|^2, \|\mathbf{y}\|^2, |\mathbf{x} \cdot \mathbf{y}|^2$ .)