MATH 2242-090 — Spring 2016 — Dr. Clontz — Quiz 1

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 $\mathbf{x} = \langle 1, -2, 0, 2\rangle$, $\mathbf{y} = \langle 0, 4, -3, 0\rangle$.

3. (10 points) Use the "identity of Lagrange"

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

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