Math 1502J
A. D. Andrew
Quizzes and Answers

Quiz 1. 13 January 2004

Evaluate \( \lim_{x \to 0} \frac{e^x + e^{-x} - 2x^2}{x^2} \)

Quiz 3. 12 February 2004

Let \( f \) be counter-clockwise rotation of \( \mathbb{R}^2 \) by \( \frac{5\pi}{6} \) radians, and let \( g \) be reflection of \( \mathbb{R}^2 \) across the line \( y = x \). Find

a. The matrix \( A_f \) for \( f \).

b. The matrix \( A_g \) for \( g \).

c. The matrix product \( A_gA_f \).

Quiz 4. 17 February 2004

1. (4) Fill out and turn in the attached form.

2. (6) Calculate the length of \( \mathbf{v}_1 = \begin{pmatrix} 1 \\ 3 \\ 2 \end{pmatrix} \) and determine which, if any, of \( \mathbf{v}_2 = \begin{pmatrix} -9 \\ 4 \\ 2 \end{pmatrix} \)

\( \mathbf{v}_3 = \begin{pmatrix} 12 \\ 7 \\ 5 \end{pmatrix} \) and \( \mathbf{v}_4 = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix} \) is perpendicular to \( \mathbf{v}_1 \).

Quiz 5. 24 February 2004

A linear transformation has matrix \( \mathbf{A} = \begin{pmatrix} 3 & 0 \\ 4 & 1 \end{pmatrix} \). Find a \( u-v \) equation for the image under the transformation \( \mathbf{A} \begin{pmatrix} u \\ v \end{pmatrix} = \begin{pmatrix} 4 \\ 4 \end{pmatrix} \) of the unit circle \( x^2 + y^2 = 1 \)
Quiz 6. 26 February 2004

Find a vector parametric equation for the line of intersection of the planes with equations \( x - 3y + z = 4 \) and \( y - 3z = 7 \). Does the point \( \begin{bmatrix} 9 \\ -3 \\ 2 \end{bmatrix} \) lie on this line?

Quiz 7. 30 March 2004

Find an orthonormal basis for the image of \( \begin{bmatrix} 1 & 4 & 2 \\ 0 & 1 & 1 \\ 1 & 2 & 1 \end{bmatrix} \) by applying the Gram-Schmidt process to the columns of \( A \).

Quiz 8. 6 April 2004

Calculate the determinant of \( \begin{bmatrix} 1 & 0 & 2 & 1 \\ 3 & 3 & 3 & 1 \\ 0 & 3 & 6 & 5 \\ 2 & 0 & 19 & 18 \end{bmatrix} \) by first reducing \( A \) to triangular form.

Answers

Quiz 1. 13 January 2004

1

Quiz 3. 12 February 2004

\( A_f = \frac{1}{2} \begin{bmatrix} \sqrt{3} \\ 1 \end{bmatrix}, \quad A_g = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, \quad A_g A_f = \frac{1}{2} \begin{bmatrix} \sqrt{3} \\ 1 \end{bmatrix} \)

Quiz 4. 17 February 2004

\( \left| \begin{bmatrix} v_1 \end{bmatrix} \right| = 10 \). \( v_1 \) is perpendicular to \( v_2 \) and \( v_3 \), but not to \( v_4 \).
Quiz 5. 24 February 2004

\[ y^2 = \frac{8uv}{3} + \frac{17u^2}{9} = 1 \]

Quiz 6. 26 February 2004

\[ \mathbf{r}(t) = 25 + 7t \quad \text{No.} \]

Quiz 7.

\[ q_1 = \frac{1}{\sqrt{2}}, \quad q_2 = \frac{1}{2}, \quad q_3 = \frac{1}{\sqrt{2}} \]

Quiz 8. 6 April 2004

105