

Bent Petersen 306f2005-test-2.tex Test date: November 16 2005 Time: 50 minutes

Instructions: \implies

If you do not read the instructions, then how will you know what to do? Read them now.

- This test is a multiple-choice test. Be sure you put your name on the scantron.
- You must mark your answer on the provided scantron. Fill in the appropriate bubbles on the scantron very carefully.
- You may use one 8.5 × 11 inch note sheet prepared in advance. You may write on both sides of your note sheet.
- Note sheets may not be shared. If you do not bring a note sheet you will have to do without any help notes.
- You may not use any books, notebooks, additional note sheets nor note cards.
- You are expected to have a simple scientific calculator or a modest graphics calculator available for use on this test. Calculators and other equipment may not be shared.
- You may use a simple graphics calculator but not a laptop computer nor any device capable of extensive symbolic manipulation (other than your own brain).
- There are 8 multiple-choice problems worth 12 points each.

Be sure to enter all required information on the scantron.

Section Number: 001

Form Number: 001

Important Notes:

- Note that $\log(x)$ means the *natural logarithm* of x , sometimes denoted by $\ln(x)$. The logarithm with base 10 will be denoted by $\log_{10}(x)$, the logarithm with base 2 will be denoted by $\log_2(x)$, and so on.
- Return only the scantron. You may keep the test (and your note sheet).
- Make certain your calculator is set to radian mode.

Problem 1. Compute the determinant of the matrix

$$A = \begin{bmatrix} 1 & 2 & 3 \\ k & k & k \\ 1 & 2 & 1 \end{bmatrix}.$$

- A.) 0 B.) $2k$
 C.) $3k$ D.) $k^3 - 2$ E.) None of the foregoing.

← Write letter corresponding to your answer here and mark it on the scantron (Problem 1).

Problem 2. The augmented matrix of a system of linear equations has the row reduced Gauss-Jordan echelon form

$$\begin{bmatrix} 1 & 3 & 0 & 1 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 \end{bmatrix}.$$

The system has

- A.) infinitely many solutions. B.) exactly one solution.
 C.) no solutions. D.) None of the foregoing.

← Write letter corresponding to your answer here and mark it on the scantron (Problem 2).

Problem 3. The augmented matrix of a system of linear equations is

$$\begin{bmatrix} 2 & -3 & 3 & 3 \\ 1 & -3 & 1 & -1 \\ 1 & 0 & 2 & 3 \end{bmatrix}.$$

The system has

- A.)** infinitely many solutions. **B.)** exactly one solution.
C.) no solutions. **D.)** None of the foregoing.

← Write letter corresponding to your answer here and mark it on the scantron (Problem 3).

Problem 4. The augmented matrix of a system of linear equations is

$$\begin{bmatrix} 2 & -3 & 3 & 3 \\ 1 & -3 & 1 & -1 \\ 1 & 0 & 2 & 4 \end{bmatrix}.$$

The system has

- A.)** infinitely many solutions. **B.)** exactly one solution.
C.) no solutions. **D.)** None of the foregoing.

← Write letter corresponding to your answer here and mark it on the scantron (Problem 4).

Problem 5. The augmented matrix of a system of linear equations is

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 2 & -2 & 3 \\ 1 & 4 & 4 & 2 \end{bmatrix}.$$

The system has

- A.)** infinitely many solutions. **B.)** exactly one solution.
C.) no solutions. **D.)** None of the foregoing.

← Write letter corresponding to your answer here and mark it on the scantron (Problem 5).

Problem 6. Let

$$A = \begin{bmatrix} 1 & 4 & 2 \\ k & 4 & k \\ 3 & 2 & 1 \end{bmatrix}.$$

For what values of k is the matrix A invertible, i.e., for what values of k does the matrix A have an inverse?

- A.)** all k with $k \neq 1$ **B.)** all k with $k \neq 2$
C.) all k with $k \neq 3$ **D.)** all k **E.)** None of the foregoing.

← Write letter corresponding to your answer here and mark it on the scantron (Problem 6).

Problem 7. Let

$$\vec{a} = \begin{bmatrix} 1 \\ 2 \\ -2 \end{bmatrix}, \quad \vec{b} = \begin{bmatrix} 3 \\ 0 \\ 2 \end{bmatrix}, \quad \vec{c} = \begin{bmatrix} 1 \\ -1 \\ 2 \end{bmatrix}, \quad \vec{d} = \begin{bmatrix} 1 \\ 5 \\ -6 \end{bmatrix}.$$

Compute the dimension of $\text{span}(\vec{a}, \vec{b}, \vec{c}, \vec{d})$.

- A.)** 1 **B.)** 2
C.) 3 **D.)** 4 **E.)** None of the foregoing.

← Write letter corresponding to your answer here and mark it on the scantron (Problem 7).

Problem 8. The vectors

$$\vec{a} = \begin{bmatrix} 4 \\ 5 \\ 0 \end{bmatrix}, \quad \vec{b} = \begin{bmatrix} -1 \\ 1 \\ 3 \end{bmatrix}, \quad \vec{c} = \begin{bmatrix} -2 \\ -1 \\ 2 \end{bmatrix},$$

are

- A.)** linearly independent **B.)** linearly dependent **C.)** Neither of the foregoing.

← Write letter corresponding to your answer here and mark it on the scantron (Problem 8).

Use the backs of the test pages for scratch work.