CONCORDIA UNIVERSITY

Department of Mathematics and Statistics		
Course	**Number**	**Section**
Mathematics	204/1	AA
Examination	**Date**	**Pages**
Midterm	May 23, 2012	1
Instructor		**Course Examiner**
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Instructions: The marks for each problem are indicated (100%=30 pts).
Time allowed: 90 min.
This is a closed book test, notes are not allowed.
Only calculators approved by the Department are allowed.

1. Consider the linear system

$$\begin{aligned} x - 2z &= 3 \\ 2x - y - 3z &= 4 \\ -x + 2y + (a^2 - 1)z &= a + 2 \end{aligned}$$

[5 pts]

Find the values of a for which the system has no solution, exactly one solution or infinitely many solutions.

2. Find the coefficients a, b, c in the equation of a parabola

$$y = ax^2 + bx + c$$

[5 pts]

that passes through the points $(0, -1)$, $(-2, 7)$ and $(3, 2)$.
(**Hint:** For each point the condition of being on the parabola gives a linear equation in a, b, c. The solution of this linear system gives the unknown coefficients.)

3. Find the determinant of the matrix

[5 pts]

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

4. Find the inverse of the matrix if it is invertible:

[5 pts]

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

5. Find all scalars c_1, c_2 such that

$$c_1(-1, 2) + c_2(2, -4) = (3, -6).$$

[5 pts]

(**Hint:** Calculate the left hand side first and then by comparing the components of the vector on the left and of the vector on the right leads to two linear equations for c_1, c_2.)

6. Find the norm (length) of the vector

[5 pts]

$$\vec{v} = (-4, 1, 0, -8).$$

Calculate the entries of the normalized unit vector corresponding to $\vec{v}$.

For detailed solution contact Merlin (514)568-3394