L	A	S	T		N	A	M	E					

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Cover Sheet for 2013-2014 Spring Semester MATH 3210/5210 (Barsamian) Homework 7
(Due Friday, April 4, 2014. Staple this page to the front of your work.)

Problem:	1	2	3	4	5	Total	Rescaled
Your Score:							
Possible:	20	20	20	20	20	100	10

[1] (20 points) (Five True False questions from suggested exercise 4.4#1.) The True/False answers for some of the questions are given in the back of the book. For each question, give the true/false answer and also explain why the answer is true or false. Justify your explanation by referring to things that the book says in Section 4.4

4.4#1 (c) If two rows or columns of a matrix A are identical, then $det(A) = 0$.
4.4#1 (g) The determinant of an upper-triangular $n \times n$ matrix is the product of its diagonal entries.
4.4#1 (i) If $A, B \in M_{n\times n}(F)$, then $det(AB) = det(A)det(B)$.
4.4#1 (j) If Q is an invertible matrix, then $det(Q^{-1}) = \big(det(A)\big)^{-1}$.
4.4#1 (k) A matrix Q is invertible if and only if $det(Q) \neq 0$.

[2] (20 points) (Similar to suggested exercise 4.4#2(b),(d))
Evaluate the determinant of the following matrices. Show all details of the calculations.
(a) $A = \begin{pmatrix} 3 & -5 \\ 1 & 2 \end{pmatrix}$ **(b)** $b = \begin{pmatrix} 5i & 7i \\ -3 & 2i \end{pmatrix}$

[3] (20 points) (Similar to suggested exercise 4.4#3(d)) Evaluate the determinant along the third row. Show all details of the calculation.

$$A = \begin{pmatrix} 2 & 0 & 7 \\ 3 & -1 & 1 \\ 0 & 2 & -1 \end{pmatrix}$$

[4] (20 points) (Similar to suggested exercise 4.4#5) Suppose that a matrix $A \in M_{n\times n}(F)$ can be written in the form $A = \begin{pmatrix} P & Q \\ 0 & I \end{pmatrix}$ where $P, Q, 0, I$ are square matrices, 0 is the zero matrix, and I is the identity matrix.
Prove that $det(A) = det(P)$. Justify the statements of your proof using information from Section 4.4 of the book.

[5] (20 points) (Similar to suggested exercise 5.1#2(b)
Let V be the vector space $V = P_1(R)$ with basis $\beta = \{v_1, v_2\} = \{3 + 2x, 4 + 3x\}$
Let $T: P_1(R) \to P_1(R)$ be the linear transform $T(a + bx) = (-11a + 12b) + (-6a + 6b)x$.
(a) Compute $[T]_\beta$. Show all details of the calculation and explain your steps.
(b) Are the basis vectors v_1, v_2 eigenvectors for T? Explain why.
(c) If the vectors v_1, v_2 are eigenvectors for T, then what are the eigenvalues? Explain.