M428 Homework 2

Name: _____ 8-Digits NUID: _____

Instructions: Use this header template in the same proportion for submission. Scan your work and submit it to Gradescope.

1 (5 points). Let $A = \begin{bmatrix} 1 & 2 & 3 & 1 \\ 1 & 3 & 7 & 3 \\ 2 & 4 & 6 & 4 \end{bmatrix}$. Consider the augmented matrix

$$B = [A \vdots I]$$

where I is the 3-by-3 identity matrix.

(a) Use elementary row operations to obtain the reduced row echelon form of B. At each step, record the corresponding elementary matrix E_i.

(b) Find the product of the elementary matrixes: $E = E_k \cdot E_{k-1} \cdots E_1$.

(c) Explain why E can be found from (a). Explain why E is the inverse matrix for $C = [a_1, a_2, a_4]$ where a_i is the ith column of A.

2 (5 points). The Primo Insurance Company is introducing two new product lines: special risk insurance and mortgages. The expected profit is \$5 per unit on special risk insurance and \$2 per unit on mortgages. Management wishes to establish sales quotas for the new product lines to maximize total expected profit. The work requirements are as follows:

	Work-Hours per Unit		
Department	Special Risk	Mortgage	Work-Hours Available
Underwriting	3	2	2400
Administration	0.5	1	800
Claims	2	0.2	1200

Formulate a linear programming model for this problem.