Math 320 Linear Algebra
Assignment # 5

1. Let $T : \mathbb{R}^2 \to \mathbb{R}^2$ be defined by rotating every vector by $2\pi/3$ (120°) counter-clockwise. Find the standard matrix of this transformation.

2. Let:
$$A = \begin{bmatrix} -4 & -8 & -2 & -8 & -7 \\ 1 & 2 & 0 & 0 & -1 \\ 2 & 4 & 1 & 4 & 7/2 \\ 2 & 4 & 1 & 0 & -5/2 \end{bmatrix}$$
and define $T : \mathbb{R}^n \to \mathbb{R}^m$ defined by $T(\vec{v}) = A\vec{v}$. Remember you may use an calculator to row reduce for example: Row Reduction Calculator. Of course, you could do it by hand to practice for the exam.
   (a) What are m and n?
   (b) Is T one-to-one?
   (c) Is T onto?
   (d) Find $\vec{b} \in \mathbb{R}^4$ such that $\vec{b} \notin \text{Im}(T)$.