MATH 215
Practice Section 2.1

Given the matrices below $A = \begin{bmatrix} 4 & -2 \\ -3 & 0 \\ 3 & 5 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$

1. Compute the product AB in two ways:

   (a) by the definition Ab_1 and Ab_2

   (b) the row-column rule.

2. Compute $(AB)^T$, A^T, B^T, $A^T B^T$ and $B^T A^T$.

3. Let $u = \begin{bmatrix} 3 \\ -2 \\ 1 \end{bmatrix}$ and $v = \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}$. Compute $u^T u$, uu^T, $u^T v$, $v^T u$, vu^T, and uv^T.

4. Let $u = \begin{bmatrix} -2 \\ 1 \end{bmatrix}$. Compute $P = I - 2uu^T/(u^T u)$ where I is the 2×2 identity matrix. What does $P^2 =$? After finding P^2 for the specific example, try to show this result in general. i.e. what does $P^2 =$? for any vector u in R^n.