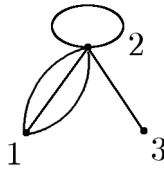


**Math 60**  
**Homework 10**

Name \_\_\_\_\_  
Due Wednesday December 7 before 4:00 PM

1. Let  $B$  be the bilinear form  $B((u_1, u_2), (v_1, v_2)) = 2u_1v_1 - u_2v_1 + 3u_1v_2 - u_2v_2$ . Find the matrix  $A$  such that  $B(\vec{u}, \vec{v}) = \vec{u}^T A \vec{v}$  where  $\vec{u} = \begin{bmatrix} u_1 \\ u_2 \end{bmatrix}$  and  $\vec{v} = \begin{bmatrix} v_1 \\ v_2 \end{bmatrix}$ .
2. Find  $\vec{u}^*(\vec{v})$  if  $\vec{u} = \begin{bmatrix} 3 \\ 1 \end{bmatrix}$  and  $\vec{v} = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$  using the bilinear form in problem 1.
3. How many paths of length 4 from vertex 2 to vertex 3 are there in the graph below?



4. Find a stable state for the stochastic matrix  $A = \begin{bmatrix} 0.5 & 0.3 & 0.2 \\ 0.3 & 0.4 & 0.4 \\ 0.2 & 0.3 & 0.4 \end{bmatrix}$ .