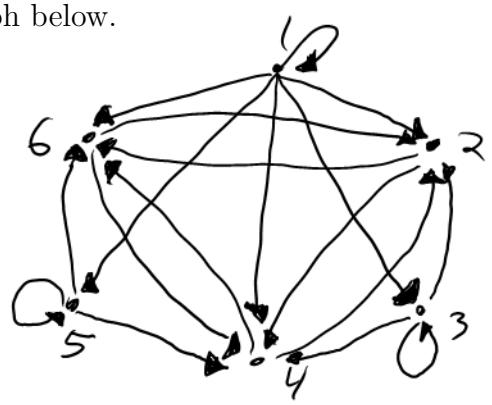
MAT 220—Homework 3

Part A:

Chapter 5 #1
Chapter 6 #2, 3, 6, 7

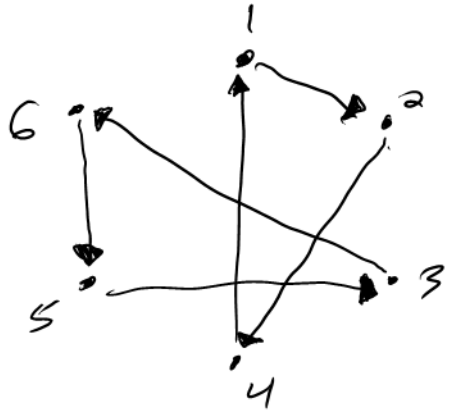
Part B:

1. Consider the graph below.



(a) Find the matrix representation of the graph.
(b) Find the density of the graph.

2. Consider the graph below.



(a) Find the matrix representation of the graph.
(b) Find the density of the graph.

3. Determine whether the vectors are linearly dependent or linearly independent. Explain why your answer is correct.
(a) $u = (3, 4)$, $v = (-6, -8)$
(b) $u = (1, 5)$, $v = (2, 3)$
(c) $u = (1, 0, 1)$, $v = (0, 2, 3)$, $w = (4, 5, 0)$
(d) $u = (1, 1, 2)$, $v = (1, 0, -3)$, $w = (5, 2, -5)$

4. Find the dimension of the subspace generated by the given vectors (the dimension of the span of the vectors or, in yet other words, the dimension of the subspace of all linear combinations of the vectors). Argue why your answer is correct. (Hint: These are the same vectors as the previous problem, so you have already shown some work in this direction.)

(a) $u = (3, 4)$, $v = (-6, -8)$

(b) $u = (1, 5)$, $v = (2, 3)$

(c) $u = (1, 0, 1)$, $v = (0, 2, 3)$, $w = (4, 5, 0)$

(d) $u = (1, 1, 2)$, $v = (1, 0, -3)$, $w = (5, 2, -5)$

5. Let $A = \begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 4 \\ 6 & -8 \end{bmatrix}$, and $v = \begin{bmatrix} 7 \\ -4 \end{bmatrix}$. Calculate the following:

(a) $\frac{1}{2}B$

(b) $2B - 3A$

(c) A^T

(d) Av

(e) $B^T v$

(f) $||A||$

(g) $||A^T v||$

(h) $||B + 2I||$