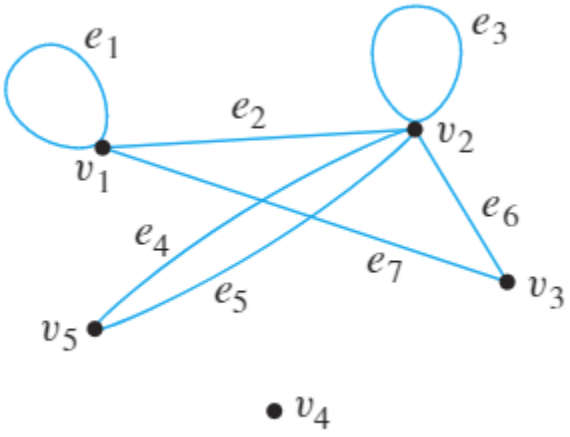
Assignment 9 – Part 1
Set 10.1 : 9, 27.b, 44 p668

For each of the graphs in 8 and 9:

(i) Find all edges that are incident on v_1.
(ii) Find all vertices that are adjacent to v_3.
(iii) Find all edges that are adjacent to e_1.
(iv) Find all loops.
(v) Find all parallel edges.
(vi) Find all isolated vertices.
(vii) Find the degree of v_3.
(viii) Find the total degree of the graph.

9.



9.i.) $e_1, e_2,$ *and* e_7 *are incident on* v_1

9.ii.) v_1 *and* v_2 *are adjacent to* v_3

9.iii.) e_2 *and* e_7 *are adjacent to* e_1

9.iv.) *Loops are* e_1 *and* e_3

9.v.) e_4 *and* e_5 *are parallel*

9.vi.) v_4 *is an isolated vertex*

9.vii.) $degree\ of\ v_3 = 2$

9.viii.) $total\ degree = 14$

27. **a.** In a group of 15 people, is it possible for each person to have exactly 3 friends? Explain. (Assume that friendship is a symmetric relationship: If x is a friend of y, then y is a friend of x.)
    b. In a group of 4 people, is it possible for each person to have exactly 3 friends? Why?

27.b.) Yes, a graph representing each person by a vertex and connecting two vertices by an edge if the corresponding people were friends. Such a graph would have 4 vertices, each of degree 3, for a total degree of 12. The total degree is even, which is what we need to show.

44. a. In a simple graph, must every vertex have degree that is less than the number of vertices in the graph? Why?
    b. Can there be a simple graph that has four vertices each of different degrees?

44.a.) Yes, the maximum degree will always be n-1, where n is the number of vertices in the graph.

44.b.) No