

1. There is a group of six students, Alice, Bob, Carol, Dave, Steve, and Tom, who are taking the same English class. Alice and Carol are always feuding. Dave and Carol are always feuding. Steve, Tom, and Alice are always feuding. Draw a graph that could represent these relationships.

2. Draw a graph with

$$V = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

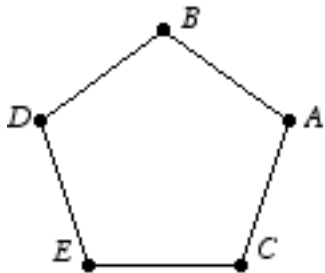
and

$$E = \{\{x, y\} \mid x \neq y \text{ and } x \text{ evenly divides } y \text{ or } y \text{ evenly divides } x\}.$$

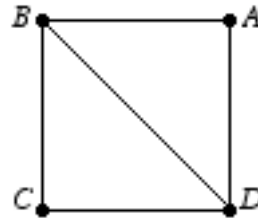
3. Draw a picture of a graph where
- there are four vertices, each with degree one.
 - there are four vertices, each with degree two.
 - there are four vertices, each with degree three.
4. Can there be a simple graph with 8 vertices and 29 edges? Why/why not?

For problems 5 and 6, write out the *adjacency list* and *adjacency matrix*.

5.



6.



7. Draw a graph with this adjacency matrix:

$$\begin{bmatrix} 0 & 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 1 & 1 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 \end{bmatrix}$$

8. Draw a graph with this adjacency list:

A : B, D, E

B : A, C

C : B, E

D : A

E : A, C

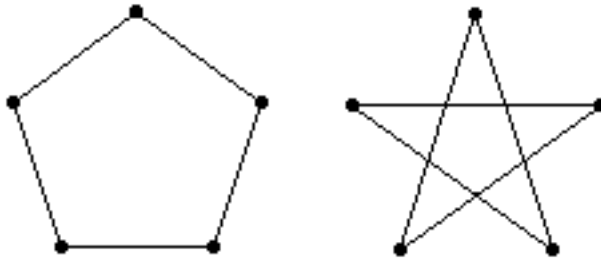
9. Consider this graph G :

$$V = \{a, b, c, d, e\}$$
$$E = \{\{a, b\}, \{a, c\}, \{a, d\}, \{a, e\}, \{b, c\}, \{b, d\}, \{c, d\}, \{c, e\}, \{d, e\}\}$$

- (a) Make a drawing of G . Be sure to label the vertices.
- (b) What is the degree sequence of G ?
- (c) Can you draw G so that there are no “phantom” crossings?

10. In each case, determine if the two graphs are isomorphic:

(a)



(b)

