# Lesson 10 — Scheduling problems

Complete the problems below with proper justification.

Problems

Scheduling

1. Schedule the tasks for the following order-requirement digraph below given that two processors are available, and state how long it takes to finish all the tasks below. The $T_1, \ldots, T_8$ are the names of the tasks, and the numbers are the time required to complete each task.
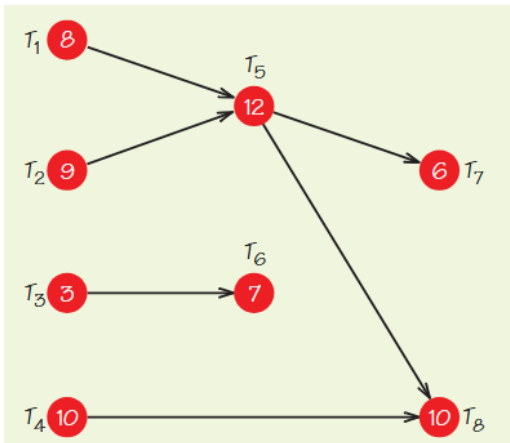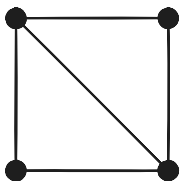

9. (a) For what value of "?" will the order-requirement digraph have a critical path of length 16?
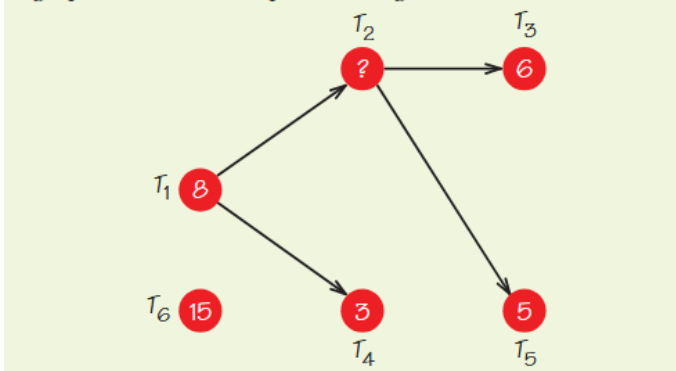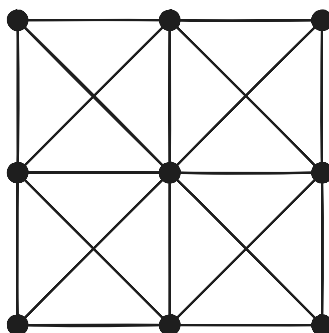

Coloring graphs

3. For the following graphs, color the vertices with as few different colors as possible such that endpoints of the same edge have different colors.
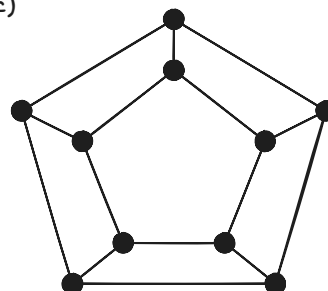
(a)

(b)

(c)

Scheduling conflicts

79. The owner of a new pet store wishes to display tropical fish in display tanks. The accompanying table shows the incompatibilities between the species, in the sense that an X indicates that it is unwise to allow those species in the row and column that meet at the X to be in the same tank.

	A	B	C	D	E	F	G	H	I
A						X	X		X
B			X					X	
C		X			X			X	
D					X	X		X	
E			X	X			X		
F	X			X			X		X
G	X				X	X		X	X
H		X	X	X			X		
I	X					X	X		

(a) Draw an appropriate graph to represent the information in the table.

(b) What is the minimum number of tanks needed to display all the fish she wishes to sell?

(c) Display the species so that the number of species in each tank is as nearly equal as possible.

80. The managers of a zoo are planning to open a small satellite branch. The animals are to be in enclosures in which compatible animals are displayed together. The accompanying table indicates those pairs of animals that are compatible. (Thus, an X in a particular row and column means that the animals that label this row and column *can* share an enclosure.)

	A	B	C	D	E	F	G	H	I	J
A	X	X		X	X	X	X			
B	X	X			X	X	X		X	X
C			X		X	X	X			
D	X			X	X	X	X		X	X
E	X	X	X	X	X			X	X	
F	X	X	X	X		X	X	X	X	
G	X	X	X	X		X	X	X		
H					X	X	X	X		
I		X		X	X	X			X	
J		X		X						X

(a) Draw an appropriate graph to represent the information in the table.

(b) What is the minimum number of enclosures needed to avoid housing incompatible animals in the same enclosure?

(c) Is it possible to enclose the animals in such a way that each enclosure contains the same number of animals?

(d) Why might that be desirable? Why might this approach to grouping the animals not be ideal?