

# MCS Assignment 2018-19 LaTeX template

abcd12

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## 1 Discrete Mathematics and Linear Algebra

### 1.1

Inductive proof, so mostly text. Text is just written as normal, if you want to include maths notation in line you use the \$ symbol we  $n \geq 1$ . If you use \$\$ it will go on a separate line.

$$2(\sqrt{n+1} - 1) < 1 + \frac{1}{\sqrt{2}} + \dots + \frac{1}{\sqrt{n}} < 2\sqrt{n}$$

### 1.2

You might want some Greek letters eg  $\sigma$  and  $\Sigma$  or maybe to square things  $a^2 = b^2 + c^2$ .

### 1.3

Some answer for q3

### 1.4

GRAPHS



Figure 1:  $P_3$

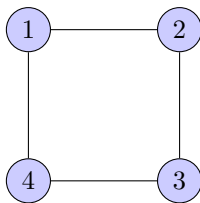


Figure 2:  $C_4$

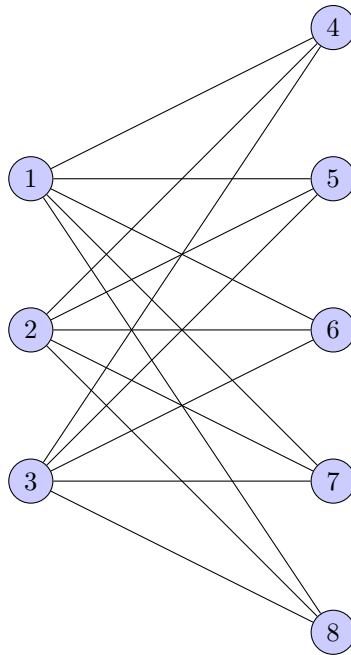


Figure 3:  $K_{3,5}$

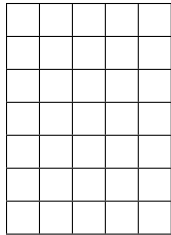
The graph in figure1 is  $P_3$ , i.e. a path on 3 nodes.  
The graph in figure2 is  $C_4$ , i.e. a cycle on 4 nodes.  
The graph in figure3 is  $K_{3,5}$ , i.e. the complete bipartite graph with sets of size 3 and 5.

## 2 Logic and Discrete Structures

### 2.1

$$\varphi = ((a \wedge b) \implies c) \wedge (a \vee b)$$

#### 2.1.1



#### 2.1.2

Since I've not used it yet:  $\neg\varphi$

### 2.2

$\{\wedge, \oplus\}$  where  $p \oplus q \equiv \neg(p \iff q)$

### 2.3

$$p \vee (q \wedge r) \vdash p \vee q$$

1.	$p \vee (q \wedge r)$	Premise
2.	$p$	Assumption
3.	$p \vee q$	$\vee_i, 2$
4.	$q \wedge r$	Assumption
5.	$q$	$\wedge_e, 4$
6.	$p \vee q$	$\vee_i, 5$
7.	$p \vee q$	$\vee_e, 1, 2 - 3, 4 - 6$

### 2.4

I guess y'all need another subsection anyway