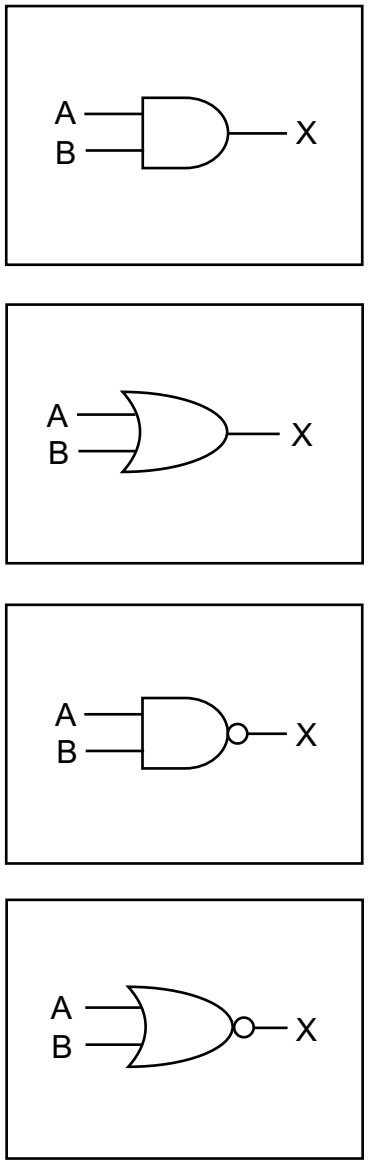
Serangoon Secondary Computing
Sec 4E
2020 Preliminary Exams (Marking scheme)

Q1a) [4 m]

Logic gates **Boolean Values**



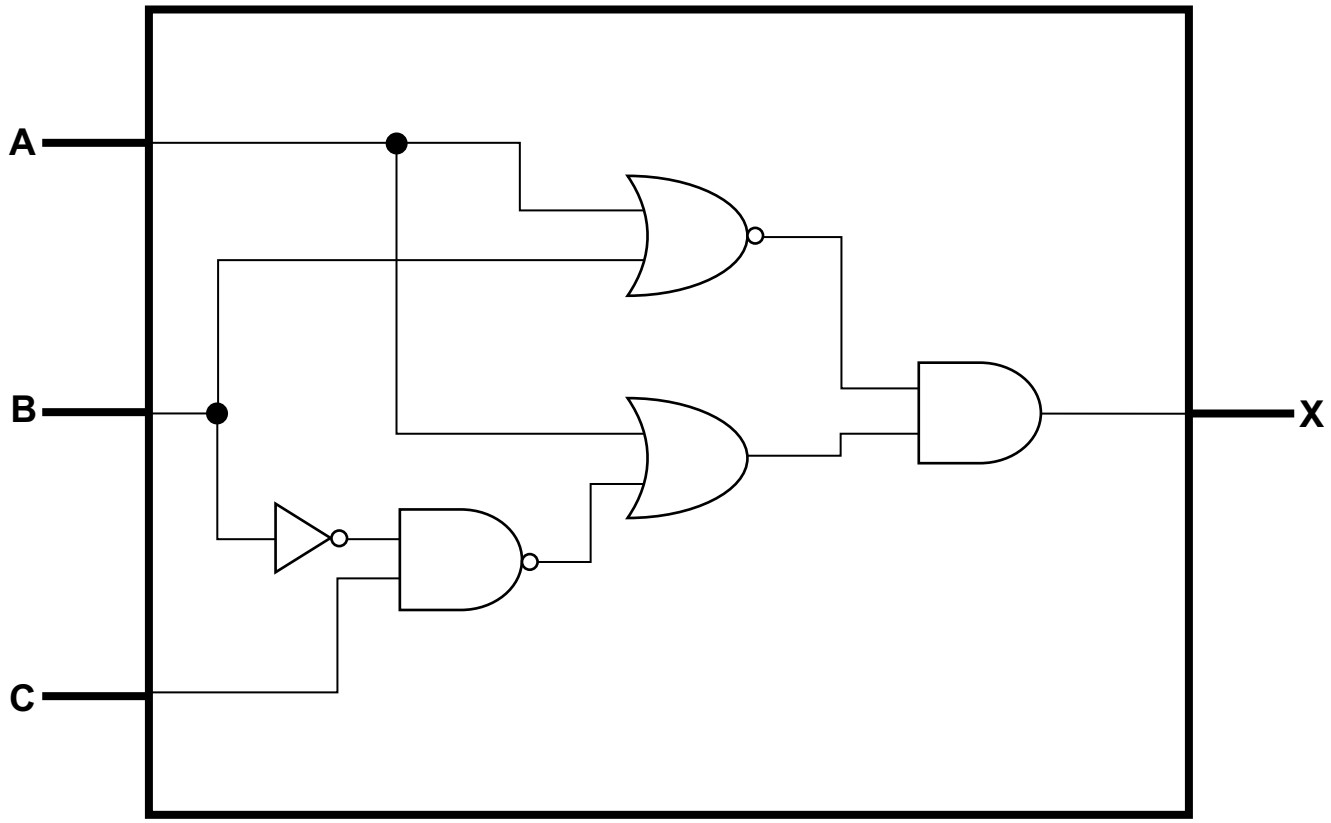
A	B	X
0	0	1
0	1	1

A	B	X
0	0	0
1	1	1

A	B	X
0	1	0
1	1	0

Q1b) [5m]

X = (**A** OR (NOT **B** NAND **C**)) AND (**A** NOR **B**)



Q1c) [4 m]

A	B	C	D (NOT B)	E (D NAND C)	F (A OR E)	G (A NOR B)	X (F AND G)
0	0	0	1	1	1	1	1
0	0	1	1	0	0	1	0
0	1	0	0	1	1	0	0
0	1	1	0	1	1	0	0
1	0	0	1	1	1	0	0
1	0	1	1	0	1	0	0
1	1	0	0	1	1	0	0
1	1	1	0	1	1	0	0

Q2) [5 m]

(a) The **network interface card** is the hardware interface that enables the transfer of data between a device and a network.

(b) The **network switch** is a device that constructs a single network by connecting two similar networks together.

(c) The **modem** is a device responsible for modulating and demodulating digital data when data is transmitted over long distances.

(d) The **router** is a device that forwards packets between separate networks.

(e) The **network hub** is a device that transmits received packets to all connected devices.

Q3a) [4 m]

Any 2 social benefits from:

- Enabled communication between people without face-to-face meetings.
- Enabled students to learn from home through the use of online learning tools and virtual classrooms tools.
- Allowed people to entertain themselves while staying at home (e.g. mobile gaming communities, live video streaming etc)
- Keep people updated with latest news.
- Encourages community driven efforts that benefits the society during the lockdown (e.g. donation drives, food distribution drives etc)
- Any other relevant answers.

Any 2 economic benefits from:

- Allowed business to reach out to customers through online marketing and social media when retail businesses were required to shutdown.
- Reduced business costs from overseas travel with the use of cheap and effective video conferencing tools in place of face-to-face meetings.
- Enabled consumers to spend, borrow, invest and save money through electronic applications without the need for face-to-face interactions.
- Create job opportunities such as online food delivery and delivery.
- Any other relevant answers.

Q3b) [2 m]

Any 2 negative impacts from:

- People are easily misled by the spreading of rumours and false information online.
- Cyberattacks and cybercrimes targeted at vulnerable groups of people lead to loss of money.
- Increase in cyber addiction rates which may lead to deficiency in real-life social skills and abandoning of responsibilities.
- Excessive screen time may lead to health problems (e.g. insomnia, eyestrain, increased anxiety etc).
- Any other relevant answers

Q4a) [2 m]

$(1\ 0\ 0\ 1\quad 0\ 1\ 1\ 0)_2$
$= 2^1 + 2^2 + 2^4 + 2^7$
$= 2 + 4 + 16 + 128$
$= \underline{150}$

Q4b) [2 m]

Denary	Quotient	Remainder
459	28	11 (B)
28	1	12 (C)
1	0	1

$459 = \underline{1CB_{16}}$

Q4c) [3 m]

Any 3 relevant points from:

- Represented by 3 bytes of data (6 hexadecimal digits); 1 byte of data to represent each of the intensities of red, blue and green colours.
- Each colour intensity ranges from 00 (lowest intensity) to FF (highest intensity). Range of colours from 000000 to FFFFFF
- If all three colour intensities are 0 (000000), the resulting colour is black. If all three colour intensities are F (FFFFFF), the resulting colour is white.
- RGB colour code displayed in the form RRGGBB, where RR, GG and BB are two-hexadecimal numbers ranging from 0 to F.
- 16,777,216 different colours can be represented using the RGB colour code.
- RGB colour codes are used in websites using HTML or CSS.

Q5a) [1 m] Number / integer

Q5b) [2 m] = (C3 * B7) + (C4 * C7)
OR
= (C3 * B7) + (C4 * C7)

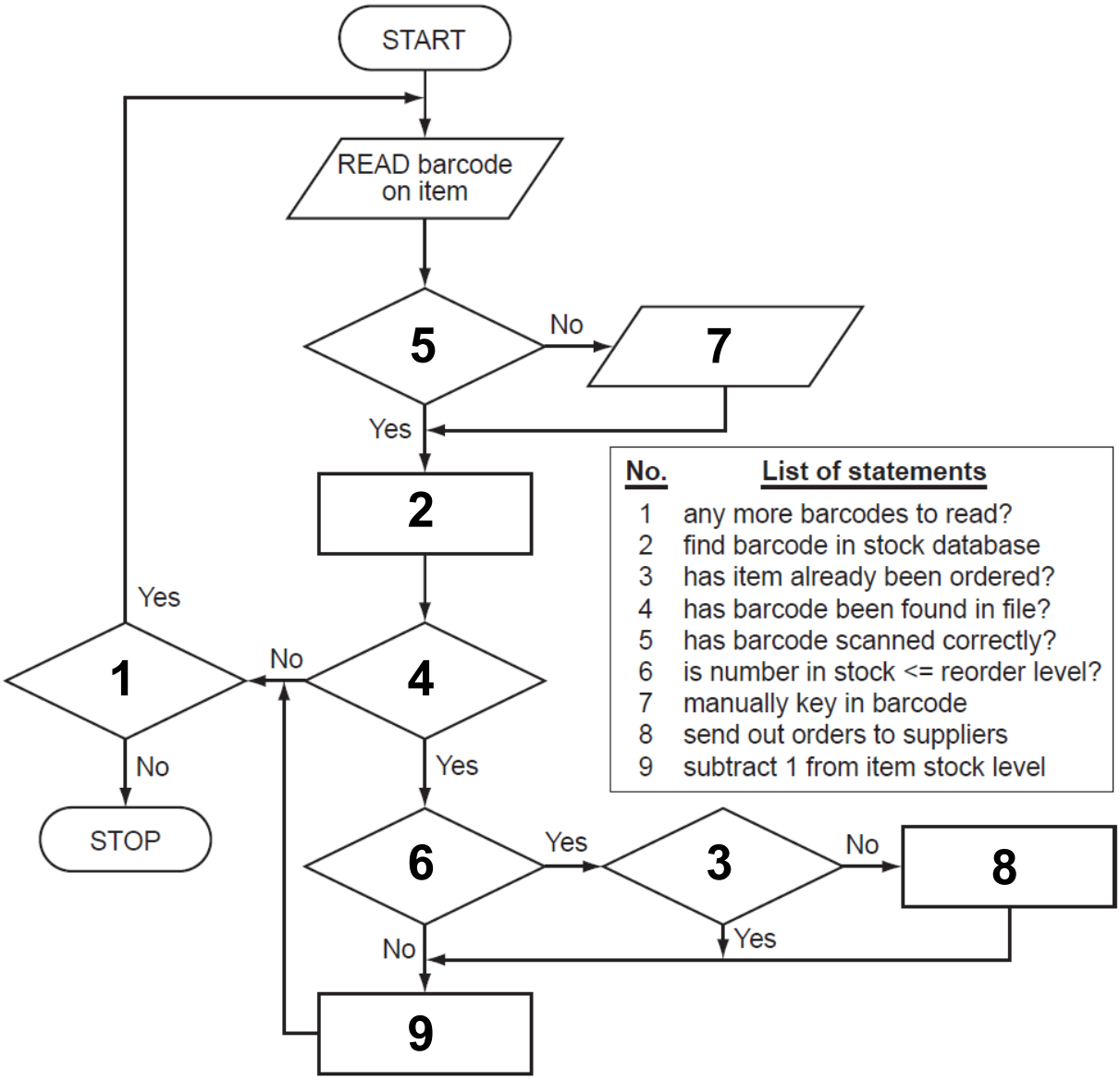
Q5c) [2 m]

Any 2 relevant points from:

- Cells C3 and C4 must be absolutely referenced for the formula in cell D7 (if answer in 5b shows absolute referencing, assume student has stated this point)
- Select cell D7, (right-click) copy the cell and (right click) paste on cells D8 to D11
- Select cell D7, move mouse to the bottom right corner of the cell until a plus-shaped (+) cursor can be seen; click and drag the cursor all the way to cell D11

Q5d) [2 m] =IF(D7>E7,"Profit","Loss")

Q6) [5 m] 1 to 2 correct statements matched:
3 to 4 correct statements matched:
5 to 6 correct statements matched:
7 to 8 correct statements matched:
All statements matched correctly:



Q7a) [2 m]

Any 2 relevant input devices from:

- Barcode scanner / Scanner / Camera
- Number pad / Keyboard / Touchscreen panel
- Thermal scanner

Q7b) [4 m]

Any 4 relevant modules from:

- NRIC barcode scanning module
- Contact number form module
- Database search modules (accept any meaningful names, limit to 1 only)

- Databae sentry modules (accept any meaningful names, limit to 1 only)
- Gantry operation module
- LCD display module

Q7ci) [2 m]

Variable	Data Type
`valid_contact`	boolean
`contact_num`	string

Q7cii) [2 m]

Both answers in any order:
- Length check
- Format check

Q7ciii)[2 m]

Test case condition	Test data
Normal	Accept any telephone number that start with “6” or “9” and is exactly 8 characters long. E.g. 91234567
Error	Accept any telephone number that does not start with “6” or “9”, or is not exactly 8 characters long. e.g. 12345678, 9876543

Q7civ) [2 m]

Line number: 09
Changed line:

```
IF contact_num[0]!="9" or contact_num[0]!="8"
or contact_num[0]!="7" or contact_num[0]!="6"
```

OR

```
IF contact_num[0] NOT IN ["6","7","8", "9"]
```

Q8a) [5 m]

Accept	Reject	Count	Sack	OUTPUT
0	0	0	49.2	7, 3
1	1	1	50.4	
2	2	2	49.5	
3	3	3	50.2	
4		4	50.0	
5		5	49.7	
6		6	50.1	
7		7	51.3	
		8	50.5	
		9	50.6	
		10		

Q8b) [1 m]

Any 2 relevant points from:

- Input 10 floating point (decimal) numbers
- Counts the number of accepted values (more than or equal to 49.5 and less than or equal to 50.5) and rejected values
- Outputs the number of accepted and rejected values.

Q8c) [2 m]

Both changes in any order:

- Change “Is Count = 10?” to “Is Count = 30?”
- Remove “Is Sack < 49.5?” symbol.

Q9) [8 m]

All 4 errors in any order:

- Error 1: line 04
  Correction: `WHILE Number < 0` **`OR`** `Number > 100`

- Error 2: line 08
  Correction: `NumArray[`**`Index`**`] = Number`

- Error 3: line 09
  Correction: `IF Number >`**`=`**` 50 THEN Count = Count + 1`

- Error 4: line 10
  Correction: ~~`Until Count = 40`~~ **`NEXT Index`**

  OR entire line 10 is removed

Q10) [7 m]

- Initialization of 2 variables to count number of days each city had a higher daily average temperature
- Initialization of 2 variables to record the highest daily average temperature in City A (set to a very low value) and lowest daily average temperature in City B (set to a very high value.
- Loop management 365 repetitions
- Input 2 temperatures values
- Compare the 2 values
- …… and increase count for city with higher temperature
- Check if value input for City A is higher than the highest recorded value for City A
- …… and update as highest value if it is higher
- Check if value input for City B is lower than the lowest recorded value for City B
- …… and update as lowest value if it is lower
- Output the 4 pieces of data

Sample algorithm:

```
CityACount = 0
CityBCount = 0
CityAHighest = -999
CityBLowest = 999
```

```
FOR Days = 1 to 365
    Input CityA, CityB
    IF CityA > CityB
        CityACount = CityACount + 1
    ELSE IF CityB > CityA
        CityBCount = CityBCount + 1
    ENDIF

    IF CityA > CityAHighest
        CityAHighest = CityA
    ENDIF

    IF CityB < CityBLowest
        CityBLowest = CityB
    ENDIF
NEXT Days

OUTPUT 'City A had ' + CityACount + ' days with a
    higher daily average temperature.'

OUTPUT 'City B had ' + CityBCount + ' days with a
    higher daily average temperature.'

OUTPUT 'The highest daily average temperature
    recorded in City A was ' + CityAHighest

OUTPUT 'The lowest daily average temperature
    recorded in City B was ' + CityBLowest
```