

Question 5

(4 marks)

Data integrity in a database can be divided into three categories: referential integrity, domain integrity and entity integrity.

- (a) Outline the meaning of each of the following. (2 marks)

Referential integrity: _____

Entity integrity: _____

- (b) Describe how data integrity can improve the process of database management. (2 marks)

Question 8

(7 marks)

The spreadsheet below shows projects being worked on by employees. Each department may have many employees, but an employee works for only one department.

Proj Code	Project Name	Budget	Employee First Name	Employee Surname	Hourly Rate	Dept Code	Dept Name
1	Online Learning	\$50 000	Bob	Wilson	\$45.00	D001	IT
1	Online Learning	\$50 000	Nikita	Saw	\$60.00	D002	CLT
1	Online Learning	\$50 000	Ahmed	Khan	\$85.00	D004	Admin
2	Sport System	\$30 000	Bob	Wilson	\$45.00	D001	IT
2	Sport System	\$30 000	Nikita	Saw	\$60.00	D002	CLT
2	Sport System	\$30 000	Ling	Chan	\$72.00	D005	Finance
2	Sport System	\$30 000	Harry	Greats	\$90.00	D003	Phys Ed
3	HR Database	\$10 000	Ahmed	Khan	\$85.00	D004	Admin
3	HR Database	\$10 000	Mike	Jones	\$72.00	D005	Finance
3	HR Database	\$10 000	Clara	Smith	\$120.00	D001	IT
4	Wireless upgrade	\$70 000	Bob	Wilson	\$45.00	D001	IT
4	Wireless upgrade	\$70 000	Ling	Chan	\$72.00	D005	Finance

(a) Define 'delete anomaly' and use the data above to give an example of a delete anomaly. (2 marks)

(b) Define 'update anomaly' and use the data above to give an example of an update anomaly. (2 marks)

(c) Normalise the data to 3rd normal form (3NF). (3 marks)

- You need only show the relations and fields in your answer, not the actual data.
- You may need to create additional fields.

The Project table has been done for you.

PROJECT(ProjCode, ProjectName, Budget)

Question 24

(3 marks)

Data mining can be used to discover or identify similar patterns in transaction data for a given time period.

- (a) Identify an example of how this process could be used by a supermarket business. (1 mark)

- (b) Outline a legal and an ethical consideration that the supermarket business needs to be aware of. (2 marks)

Question 26

(35 marks)

Refer to the image of the Database Dashboard available to volunteers in the Source booklet on page 3.

- (a) Using Chen's notation, draw an Entity Relationship (ER) diagram that represents this part of the database.

Include the following:

- names of all primary keys
- names of all foreign keys
- relationships
- cardinality.

Your diagram will need to resolve all many-to-many relationships. (23 marks)

Use the information below to answer Question 26.

The Database Dashboard for volunteers is shown below.

Assume the following:

- an Event has many Volunteers and Jobs
- a Volunteer can do many Events and many different Jobs, even at the same event
- Volunteers can complete many Training courses
- Training courses are available to all Volunteers.

Volunteer Personal Site

Record Training	Your Information	Volunteer Jobs	Log Hours
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<p>Jack Smith</p> <p>j.smith@gmat.com.au</p> <p>0418 937 876</p> <p>Skills</p> <p>First aider Working at Heights Forklift Fire fighter</p> <p>Update</p>	<h3>Recent Volunteer History</h3> <table border="1"> <thead> <tr> <th>Date</th> <th>Event</th> <th>Job</th> <th>Hours</th> </tr> </thead> <tbody> <tr> <td>01/11/2021</td> <td>201</td> <td>First aid</td> <td>5</td> </tr> <tr> <td>09/11/2021</td> <td>209</td> <td>Traffic controller</td> <td>3</td> </tr> <tr> <td>16/12/2021</td> <td>213</td> <td>Fire fighter</td> <td>6</td> </tr> <tr> <td>18/12/2021</td> <td>216</td> <td>Fire fighter</td> <td>4</td> </tr> <tr> <td>18/11/2021</td> <td>216</td> <td>First aid</td> <td>3</td> </tr> <tr> <td>21/11/2021</td> <td>219</td> <td>First aid</td> <td>5</td> </tr> </tbody> </table> <p>The Last 12 Months!</p> <table border="1"> <thead> <tr> <th>Month</th> <th>Hours</th> </tr> </thead> <tbody> <tr><td>Nov</td><td>21</td></tr> <tr><td>Dec</td><td>38</td></tr> <tr><td>Jan</td><td>41</td></tr> <tr><td>Feb</td><td>14</td></tr> <tr><td>Mar</td><td>35</td></tr> <tr><td>Apr</td><td>21</td></tr> <tr><td>May</td><td>12</td></tr> <tr><td>Jun</td><td>5</td></tr> <tr><td>Jul</td><td>6</td></tr> <tr><td>Aug</td><td>19</td></tr> <tr><td>Sep</td><td>24</td></tr> <tr><td>Oct</td><td>34</td></tr> </tbody> </table>	Date	Event	Job	Hours	01/11/2021	201	First aid	5	09/11/2021	209	Traffic controller	3	16/12/2021	213	Fire fighter	6	18/12/2021	216	Fire fighter	4	18/11/2021	216	First aid	3	21/11/2021	219	First aid	5	Month	Hours	Nov	21	Dec	38	Jan	41	Feb	14	Mar	35	Apr	21	May	12	Jun	5	Jul	6	Aug	19	Sep	24	Oct	34
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Scheduled Volunteer Shifts

Date	Time	Event	Job	Details	Cancel
23/11/2021	10.00 am	23	First aid	✓	X
26/11/2021	08.00 pm	32	First aid	✓	X
31/12/2021	04.00 pm	41	First aid	✓	X
31/12/2021	11.00 am	41	Traffic controller	✓	X
01/01/2022	08.00 pm	42	First aid	✓	X

Emergency volunteer shifts may be added. Click details to accept or cancel.

NEXT

Question 2

(2 marks)

Describe the role of open systems in database interconnectivity.

Question 23 (continued)

(b) Refer to your ER solution in part (a) and write a query using Structured Query Language (SQL) that will display the Rego_ID, entry and exit time of cars that were parked for three hours or more, and have been charged more than \$10 for parking.

- Rego_ID
- Entry_time
- Exit_time
- Actual_Cost

(4 marks)

(c) Using the above as an example, explain the difference between 2NF and 3NF. (3 marks)

Question 23

(20 marks)

Carpark Services is using an online database system to track the entry and exit of cars in its car parks. The following information has been provided to you by Carpark Services.

- Many cars can use one carpark.
- One car can visit many different car parks.
- Many cars can visit the same carpark multiple times on the same day.
- One car can incur many parking costs.
- One car is fitted with one licence plate number (Rego_ID).

(a) Using Chen's notation, draw an Entity Relationship (ER) diagram that includes the following:

- names of all primary keys
- names of all foreign keys
- relationships
- cardinality.

You need to resolve all many-to-many relationships.

(13 marks)

Question 20

(3 marks)

Using an example, explain the ethical implications of the use of data mining.

Question 16

(6 marks)

Different database architectures have different strengths and weaknesses.

- (a) Describe **one** difference between centralised and distributed databases. (2 marks)

- (b) State **one** example of where a distributed database would have an advantage over a centralised database. (1 mark)

- (c) Consider a distributed database. Multiple clients each keep a local working copy of a database that is written back periodically to a master central copy. Using an example, explain **one** problem with this method. (3 marks)
