

## Information Systems Prelim 0809

## Section I

1. Deleting an order may remove all trace of a particular item from the database. E.g. deleting this order may mean that it would no longer be possible to tell how much the Sony 450 ISUX camera costs. This would happen if this is the only order for that camera.
2. Information is data which is given meaning and context, Eg. West Ham 6 Reading 1, is information regarding a football score.  
Knowledge is inferred from information and produces new information, e.g. from the given information it can be inferred that West Ham are a better football team than Reading.
3. What if the person changes their level from Beginner to Experienced? The primary key would no longer be valid and would have to be changed which could be problematic across related tables.  
There could be duplicate values of a primary key, e.g. 2 beginners with the initials JT (Jamie Thorn) born on 22/03/91.
4. a. Title is a multi-valued attribute as when a member makes a transaction, they may take out several different DVDs, so for each value of Rental No., there could be many values of title.  
b. A domain constraint applied to the cost attribute could be setting a restricted value so that only values between 50p and £5, say, are accepted.
5. A Gantt chart give an easy to follow visual representation of tasks in a project, and make it easy for schedules to be amended in accordance with resources etc.

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## Section I

6. The Regulation of Investigatory Powers Act.
7. Entity integrity is ensuring that an entity has a primary key with values which are both unique and non-null.  
Referential integrity is where a value of a foreign key can only exist if there is a corresponding value for a primary key which exists in another table.
8. A template allows a website to have a consistent, house style applied across the whole of a web site.  
It also allows features to be created one time only, yet applied as many times as required at the touch of a button.
9. A global website can allow a company reach out to new markets and increase their customer base and, hopefully, profit margins.  
It allows companies the chance to market their business abroad and generate online sales without the costs involved in setting up a branch on foreign soil.
10. The information is incomplete in that one of the segments is not labeled. Also, the percentage values are not included for each item and the title does not give any indication of what the percentage pertains to.
11. a. A Decision Support System  
b. An Executive Information System

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## Section 1

12. Pagination is the automatic setting of page settings such as page numbering, insertion of page breaks and widow and orphan control.

13. a. This entity would have a problematic compound key using several attributes. Using a surrogate key, would provide a straightforward single attribute key.

b. Vehicle ID

14. The nature is formal and quantitative.

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## Section 2

UNF

members (member no

and races name

address

telephone no

year joined

boat

race name

date

distance

conditions

time

position

points

type

length

builder

year built)

Repeating Group

# Information Systems Prelim 0809

# Section 2

INF

members (member no  
 name  
 address  
 telephone no  
 year joined  
 boat  
 type  
 length  
 builder  
 year built)

results (race name  
 date  
 distance  
 conditions  
 time  
 position  
 points  
member no)\*

For key (and identification of partial dependencies)

race name	date	distance	conditions	time	position	points	member no
Adam Isle	5/6/07	6.5 miles	Windy	2 h 18 m	6	20	078
Lighthouse run	12/8/07	22.3 miles	Calm	8 h 2 m	1	25	078
Mull sprint	23/9/07	67.8 miles	Windy	16 h 7 m	18	8	078
Adam Isle	5/6/07	6.5 miles	Windy	3 h 6 m	21	5	156

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# Section 2

For 2NF

members (member no  
 name  
 address  
 telephone no  
 year joined  
 boat  
 type  
 length  
 builder  
 year built)

results (race name  
 date  
 distance  
 conditions  
 time  
 position  
 points  
member no\*)

For key (and identification of partial dependencies)

race name	date	distance	conditions	time	position	points	member no
Adam Isle	5/6/07	6.5 miles	Windy	2 h 18 m	6	20	078
Lighthouse run	12/8/07	22.3 miles	Calm	8 h 2 m	1	25	078
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Adam Isle	5/6/07	6.5 miles	Windy	3 h 6 m	21	5	156

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## Section 2

2NF

members (member no  
name  
address  
telephone no  
year joined  
boat  
type  
length  
builder  
year built)

results (race name\*  
time  
position  
points  
member no\*)

race (race name  
date  
distance  
conditions)

## Information Systems Prelim 0809

## Section 2

For 3NF

members (member no  
name  
address  
telephone no  
year joined  
boat  
type  
length  
builder  
year built)

results (race name\*  
time  
position  
points  
member no\*)

race (race name  
date  
distance  
conditions)

## Information Systems Prelim 0809

## Section 2

For 3NF

members (member no  
name  
address  
telephone no  
year joined  
boat\*)

results (race name\*  
time  
position  
points  
member no\*)

race (race name  
date  
distance  
conditions)

boat (boat  
type  
length  
builder  
year built)

## Information Systems Prelim 0809

## Section 2

3NF

members (member no  
name  
address  
telephone no  
year joined  
boat\*)

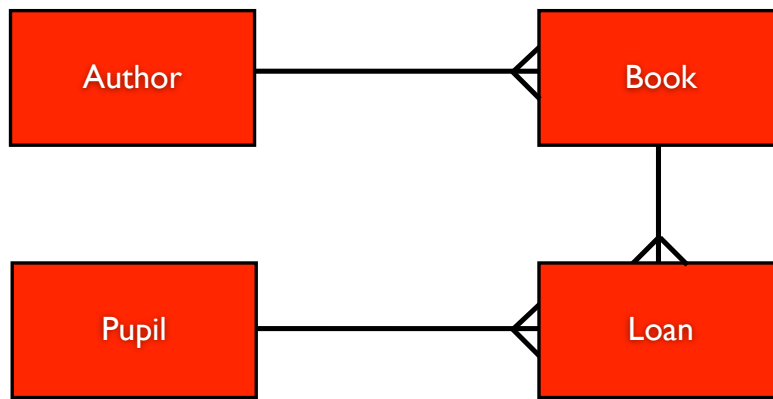
results (race name\*  
time  
position\*  
member no\*)

race (race name  
date  
distance  
conditions)

boat (boat  
type  
length  
builder  
year built)

points (position  
points)

16. a.



b. A - Text

B - Lookup value from author table

C - FK (Foreign Key)

D - Number (integer)

E - Range check (e.g. 0 to 5)

c. (i). Tables (and fields) - Pupil (pupil name, amount of fines overdue), Loan (overdue) and book (title, author name).

(ii). They have been sorted by amount followed by pupil, both in ascending order.

(ii). The RDBMS would have the facility to calculate **summary functions** across a range of records (in this case **sum**) and would have the facility to display summary information once at the bottom of the records being summarised.

17. a. Supporting legacy systems will allow all machines in the environment to continue to use the company's systems. Without this facility, some machines or software would be rendered obsolete at a time when the company does not have the finance to replace them. There may be older software systems that are crucial to the company's business that do not run readily on the new hardware and it will take time to convert to a newer version of the software.

Future proofing will ensure that as changes occur some where in the future, the company's software and hardware will be ready to adapt without the need for expensively replacing all systems again.

b. Emulation is a means of using either hardware or software into making one machine (machine A) mimic another machine (machine B) so that A can run software that is programmed to run on B.

c. The users could use on-line tutorials to develop their knowledge of the software.

They could also employ the services of the company who create the software to come in and deliver on-site training, which would be expensive but would provide face-to-face experience with industry professionals.

d. The users could use on-line forums to find out how to use the software, either set up by the company who create the software or by other user groups.

They could also use Frequently Asked Questions, likely to be found on the web site of the company who create the software.

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## Section 2

18. a. (i). Goal seek allows the user to gain an insight into what input value will be required to produce an anticipated output value. the user chooses the required output value and the goal seek facility produces the input value that would be needed.

A lookup table works much like a nested if, but produces much 'cleaner' coding, and uses a table of data to produce results, one column containing ranges which a given value is compared against, and the next column producing the appropriate output.

(ii). A macro is a function that allows a series of operations to be recorded and carried out immediately at the touch of a button, or a single key press.

b. A critical path is a listing of the tasks within a project which must be completed within a given time frame if the overall project is to finish on time.

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## Section 3

25. a. A decision support system is a mechanism for collating information that is used as part of the process by users allowing allow them to make decisions.

An expert system is designed to provide the actual advice that is used to treat a patient.

It uses a knowledge base of facts and rules, and from such the experts system itself infers new knowledge.

A DSS is used mainly at a tactical level within an organisation whereas an expert system operates at all levels.

b. Category: Planning

Main Characteristics: Provided instructions to allow a robot to navigate a room.

Major influence in development of planning expert systems.

26. a. If vessel is pleasure boat and power is by an engine THEN this boat is a power boat.

If this boat is a power boat and engine is mounted outside the stern THEN engine type is an outboard engine.

If this boat is a power boat and engine is inside the hull of the boat THEN engine type is an inboard engine engine.

If pleasure boat is powered by the wind THEN this boat is a sail boat.

b. Classification. It is being used to take an item's characteristics to state a particular group (such as pleasure boat) the item belong to. This is a means of classification.

c. (i). Many domains have information which is uncertain in nature, i.e. how sore is the pain. Using certainty factors allows the system to more accurately reflect advice in a way that a human expert would be able to.

Certainty factors allow the user to see there is an element of doubt in accepting the system's advice so they are unlikely to be completely surprised if problems arise.

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## Section 3

21. a. (i). CF conclusion = CF rule x Min (CF condition)

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## Section 3

23. a. IF weight IS low AND  
screen IS wide  
THEN advice is buy LF400

IF type IS NM AND  
processor speed IS high  
THEN advice is buy NM400

b. Advice is buy NM200  
IF screen IS wide AND  
type IS NM

24. a. The cost of paying for an expert's time during the development and testing of the system (which can be expensive depending on the expert involved).  
The cost in developing the system, such as hiring knowledge engineers and programmers to code the system.

b. The knowledge base is where the facts and rules are stored in the system.  
The user interface is where the user is asked, and answers, questions and where advice is generated. It is also where justification can be requested and reviewed.

The inference engine is where the appropriate rules are chosen and applied and where decisions are made as to when advice can be generated.

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## Section 3

24. c. In an expert system, data is represented in the knowledge base as facts and rules.

In a DBMS, data is represented in fields stored as part of a record, found in a particular table.

d. The domain expert is the person who provides the specialist knowledge to be provided in the system.

The knowledge engineer is the person who is responsible for taking the information from the expert and putting it into a format more appropriate (such as a factor table) such that it can then be entered into a knowledge representation language (KRL).

e. The programmer may have incorrectly applied the knowledge from factor table and created code which produces a wrong result. They could also have applied a certainty factor to a rule which proves to be too optimistic, resulting in the wrong advice being generated.

Anita may have incorrectly answered a question in the user interface, e.g. accidentally choosing yes to a question where she should have chosen no.

## Information Systems Prelim 0809

## Section 3

25. a. If there is a ready access to expert knowledge then it may be appropriate to develop an expert system.

If the knowledge can be represented in rules without a great deal of uncertainty in the system, then it may be straightforward to develop a working expert system.

b.  $\text{qualified}(\text{andrew}, \text{cyclespin}) \wedge \text{qualified}(\text{andrew}, \text{cyclespin})$

c. A decision support system provides output that allows a manager to analyse the given information and then make decisions based on that information.

With an expert system, all being well the output generated provides the actual decision. There is no need for further analysis from a person to make a decision.

d. What is the quality of the Why and How justification in the system?

How effectively does the system output the correct advice?

How well does the system cater for uncertainty?

How well respected in the domain is the expert who provides the advice?