Skills for Computing

December 2015

Sample Exam Marking Scheme

This marking scheme has been prepared as a **guide only** to markers. This is not a set of model answers, or the exclusive answers to the questions, and there will frequently be alternative responses which will provide a valid answer. Markers are advised that, unless a question specifies that an answer be provided in a particular form, then an answer that is correct (factually or in practical terms) **must** be given the available marks.

If there is doubt as to the correctness of an answer, the relevant NCC Education materials should be the first authority.

Throughout the marking, please credit any valid alternative point.

Where markers award half marks in any part of a question, they should ensure that the total mark recorded for the question is rounded up to a whole mark.

Answer ALL questions

Marks

Question 1

A researcher is conducting a survey to investigate how much people spend in a local shop.

a) The researcher selects a random sample of nine shoppers and asks them how much they have spent. The responses are:

£7.96 £2.82 £15.31 £13.18 £12.58 £6.32 £10.48 £9.85 £14.49

i) Is the data collected primary or secondary data? **1**
Primary

ii) Find the median of the sample. **2**
First put the data into ascending order:

£2.82 £6.32 £7.96 £9.85 £10.48 £12.58 £13.18 £14.49 £15.31

There are nine values so the median is the fifth value which is £10.48

(Award 1 mark for workings, 1 mark for correct answer)

iii) State one advantage of using the median rather than the mean. **1**
The median gives a more typical value, it is not affected by the more extreme values.
(Award 1 mark for valid comment)

b) To gain a more accurate result, the researcher decides to record the amount spent in the local shop by a larger number of shoppers.100 shoppers, including the initial sample of nine, are selected at random. The mean amount of money spent is found to be £17.56 with a standard error of £5.79

i) State the range of the amount of money spent that would give a 95% confidence interval. **1**
From £5.98 to £29.14

Question 1 continues on next page

ii) The initial sample of nine shoppers is included in the second larger sample. Was the initial sample representative? Explain your reasoning. **3**

No. the initial sample was not representative (1 mark).
5 out of the 9 shoppers spent an amount which fell outside the range of one standard error from the mean (£17.56) (1 mark)
5/9 = 56% (to the nearest percent) and if the sample was representative there should be 30% of the sample within that range.(1 mark)

c) The survey is conducted again at a later date with 100 respondents. The mean amount of money spent by shoppers was found to be £19.86 with a standard error of £6.13. Is there more variation in the results of the first or second survey? Explain your answer. **2**

There is more variation in the results of the second survey (1 mark) since the standard error is greater (1 mark).

Total 10 Marks

Marks

Question 2

The height (in cm) and age (in months) of six small children is recorded in the table below:

Age in months (x)	17	20	22	23	26	28
Height in cm (y)	76	79	81	80	83	83

a) Calculate Pearson's correlation coefficient for the set of data. **6**

Using

$$R = r = \frac{n\Sigma x_i y_i - \Sigma x_i \Sigma y_i}{\sqrt{\left(n\Sigma x_i^2 - (\Sigma x_i)^2\right)(n\Sigma y_i^2 - (\Sigma y_i)^2}}$$

x	y	xy	x^2	y^2
17	***76***	***1292***	***289***	***5776***
20	***79***	***1580***	***400***	***6241***
22	***81***	***1782***	***484***	***6561***
23	***80***	***1840***	***529***	***6400***
26	***83***	***2158***	***676***	***6889***
28	***83***	***2324***	***784***	***6889***
$\Sigma x = 136$	$\Sigma y = 482$	$\Sigma xy = 10976$	$\Sigma x^2 = 3162$	$\Sigma y^2 = 38756$

$$r = \frac{(6 \times 10976) - (136 \times 482)}{\sqrt{((6 \times 3162) - 136^2) \times ((6 \times 38756) - 482^2)}}$$

$$= \frac{304}{\sqrt{100912}}$$

$$= 0.957 \textit{ (to 3 d.p.)}$$

So the Pearson correlation coefficient is 0.957 (to 3 dp)

Award up to 4 marks for correctly constructed table of values or other appropriate workings. 1 mark for correct workings in calculation of r and 1 mark for correct value of r. Maximum for a): 6 marks

Question 2 continues on next page

b) Comment on your result (i.e. what does the result indicate?). **2**

The correlation coefficient indicates a strong (1 mark) positive (1 mark) correlation.

c) Find the mean height of the children. **2**

The mean height is

$\frac{76+79+81+80+83+83}{6}$ ***cm*** $= 80.3$ ***cm to 1 d.p).***

(Award 1 mark for workings and 1 mark for correct answer).

Total 10 Marks

Marks

Question 3

The marks of six candidates in a mathematics exam and a science exam are shown in the table below:

Candidate	1	2	3	4	5	6
Mathematics (x)	22	35	46	63	62	45
Science(y)	45	57	66	54	73	64

a) Which of the following two terms best describes this data? **2**

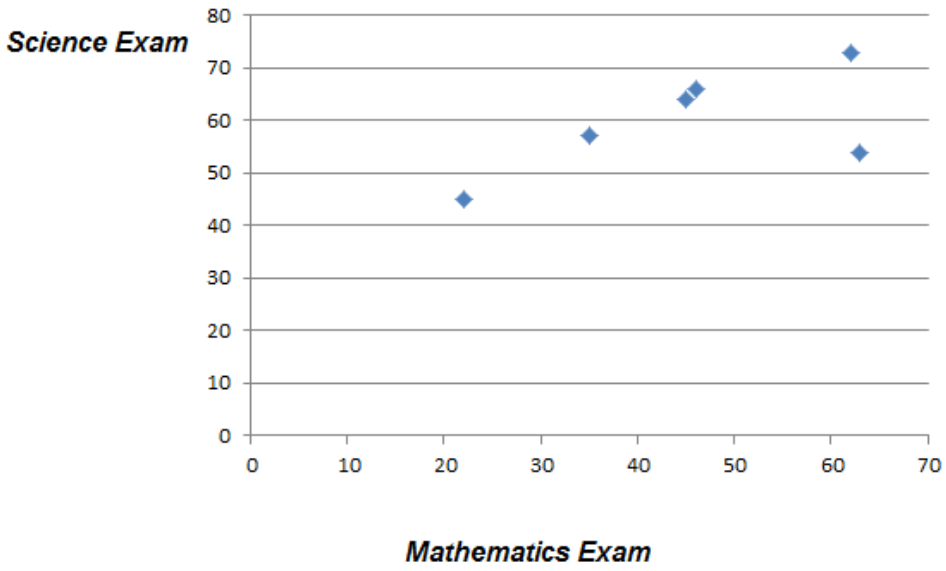
- Quantitative
- Discrete
- Continuous
- Qualitative

Quantitative (1 mark)
Discrete (1 mark)

b) Draw a scatter plot of the results. You should plot 'Mathematics Exam' on the horizontal axis and 'Science Exam' on the vertical axis. You should give your scatter plot an appropriate title and label both axis. Use the graph paper provided. **5**

Question 3 (b) continues on next page

A scatter plot showing the results of six candidates in a mathematics exam (x) and a science exam (y)



(Award 2 marks for a scatter plot with 'Mathematics Exam' on the horizontal axis and 'Science Exam' on the vertical axis and an appropriate title. Award 3 marks for accurate plotting of points - for each point plotted correctly award ½ mark.)

c) A student who achieved a result of 86 in the science exam wants to use the data to estimate their result in the mathematics exam.

i) What is this type of estimate called? **1**
Extrapolation

ii) Comment on the accuracy of using the trend line on a scatter plot to estimate this. **2**
The estimate might not be reliable (1 mark) as it is outside the range of the data collected (1 mark).

Total 10 Marks

Marks

Question 4

A theme park is deciding whether to open a new attraction as part of a strategy to increase visitor numbers. The management team has decided to apply the 'Six Hats' method to the problem.

a) The Six Hats method is going to be applied 'in parallel'. Explain what this means. **1**

This means that each member of the group involved in the discussion wears one hat and engages in the discussion using only that viewpoint. (Award 1 mark for valid description).

b) State the name of an alternative way of applying the Six Hats method to the problem. **1**

Serial application.

c) What colour hat would the chair or facilitator wear at the meeting? Explain the role of this colour hat. **4**

The chair or facilitator would wear the blue hat (1 mark).
The blue hat is cool and detached (1 mark).
It controls and organises the process (1 mark)
It is used to make a selection judgement at the end (1 mark).

(The description of the role is only intended to be indicative. Please give credit for any reasonable comments).

d) Describe the role of the yellow hat. Suggest how they might respond to the idea of opening a new attraction. Is the wearer of the yellow hat involved in predominantly right-brained or left-brained activity? **4**

The yellow hat is positive and optimistic (1 mark).
The person wearing the yellow hat looks for the benefits and advantages of any idea. In this discussion they would outline the benefits and advantages of opening a new attraction (2 marks).
(The answer above is only intended to be indicative. Please give credit for any reasonable description of the role of the yellow hat)

The wearer of the yellow hat is primarily involved in right-brained activity (1 mark).

Total 10 Marks

Marks

Question 5

a) Write down the in-text reference for the following book. **3**
Page number: 78
Title: Writing skills
Author: D. Roberts
Year of publication: 2014
Publisher: AB Publishing
Location of publisher: Melbourne

(Roberts, 2014:78)

(Award 1 mark for each correct item. If reference correct but in wrong order deduct 1 mark)

b) Give two reasons why referencing correctly is important. **2**
Possible reasons include

- ***A reference helps you to find the original source should you need to check something again***
- ***A reference helps readers to find the original source that is being referred to***
- ***Gives readers confidence in your work if they know where information has come from***
- ***Makes it clear that you have not plagiarised the work***
- ***By referencing you are acknowledging the source which is a courtesy to the author.***

(Award 1 mark for each reason given up to a maximum of 2 marks. The answer above is only indicative. Please accept any valid alternatives.)

c) Explain what Continuing Professional Development (CPD) is. Give an example of an activity that could contribute to the CPD of an IT professional. **3**
CPD is the recognition that it is necessary for a professional to continuously review and update their skills, knowledge and competencies in order to remain employable.
(Award up to 2 marks for a valid definition)
Examples of activities include professional courses, seminars, conferences, reading IT publications, journal articles, podcasts. Please award 1 mark for any valid example.

Question 5 continues on next page

d) Explain the differences between speed reading and detail reading. **2**

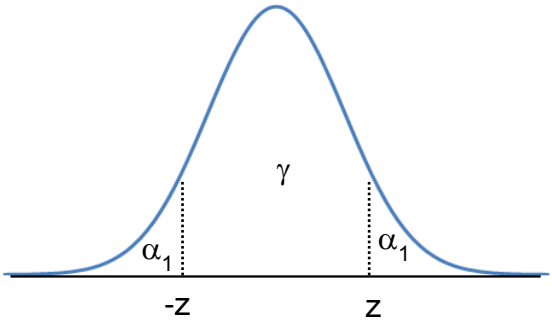
Speed reading involves extracting the key points of information from a source as quickly as possible whereas detail reading involves developing detailed notes on, and an understanding of, a key source
(Answer above is only indicative. Award 1 mark for valid description of speed reading and 1 mark for valid description of detail reading).

Total 10 Marks

End of Examination Paper

Formula sheet

1. Percentage points of the normal distribution



α_1	15.87%	15%	5.00%	2.50%	2.28%	1.00%	0.50%
γ	68.27%	70.00%	90.00%	95.00%	95.45%	98.00%	99.00%
z	1.0000	1.0364	1.6449	1.9600	2.0000	2.3263	2.5758

2. Formulae

Spearman's Rank Correlation (with no ties)

$$r_s = 1 - \frac{6\sum d^2}{n(n^2-1)}$$

The Pearson Correlation Function

$$R = r = \frac{n\sum x_i y_i - \sum x_i y_i}{\sqrt{(n\sum x_i^2 - (\sum x_i)^2)(n\sum y_i^2 - (\sum y_i)^2)}}$$

Simple Linear Regression

$\hat{y} = mx_i + c$ is the least SSE straight line where:

$$m = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sum(x_i - \bar{x})^2} \qquad m = \frac{n\sum x_i y_i - \sum x_i \sum y_i}{n\sum x_i^2 - (\sum x_i)^2}$$

$$c = \bar{y} - m\bar{x}$$

The Coefficient of Determination

$$R^2 = r^2 = \frac{\sum(\hat{y} - \bar{y})^2}{\sum(y - \bar{y})^2}$$

Marking note

Multiply original mark out of 50 by two to produce final mark out of 100 to be recorded.

Learning Outcomes matrix

Question	Learning Outcomes assessed	Marker can differentiate between varying levels of achievement
1	2, 4	Yes
2	4	Yes
3	2, 4	Yes
4	3	Yes
5	1, 3	Yes

Grade descriptors

Learning Outcome	Pass	Merit	Distinction
Be able to use various skills to support the study of Computing	Draw upon and make use of an adequate range of skills	Draw upon a variety of skills and make an appropriate selection	Draw upon a wide range of skills and make a highly appropriate selection
Be able to communicate in a technical environment	Demonstrate adequate standard of communication	Demonstrate strong and consistent standard of communication	Demonstrate highly skilful, exemplary standard of communication
Be able to deploy thinking skills and problem-solving paradigms in both a business and learning context.	Demonstrate adequate deployment of skills and paradigms	Demonstrate sound and appropriate deployment of skills and paradigms	Demonstrate highly effective deployment of skills and paradigms
Be able to handle and present data	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
Understand the need for lifelong learning	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding