Answering essay “Discuss” questions

Learning Outcome:
The aim of this activity is to help you to write discuss style essays that are asking for argument.

In exams there are often essay-style “Discuss” questions. These expect answers that are mini-essays with introduction and conclusions and an argument looking at evidence both for and against the side ultimately taken. How long an answer is expected in an exam would depend on the number of marks allocated. Write notes that would form the basis of your argument to the exam question below.

• What points can you think of suggesting the statement might be true and
• what suggesting it might be untrue.
This may require reading around the subjects first to understand the concepts and issues involved.

Discuss the truth or otherwise of the statement “For loops are not needed in a language with While loops”.

[10 marks]

The next step is to turn your points into an essay. You may wish to do so before reading on. Overleaf is an example of a fairly good answer (given there are 10 marks for the question) to give you the idea…
A “for loop” is a form of control structure for repetition. It allows a command to be repeated some given number of times. In particular they are used for counter-controlled repetition, where the number of repetitions is known before the loop starts to execute. For example,

```java
for (int j = 1; j <= 3; j++)
    System.out.println(“Hello”);
```

prints Hello three times. A while loop is also a control structure for repetition. However, it is not intended to be used specifically for counter controlled loops, but for any form of repetition. For example,

```java
while(a <= 10)
    a = a + b;
```

would repeatedly add the value of b to a until the total was more than 10.

Are for loops needed if while loops are available? In other words can anything that can be done with a for loop also be done with a while loop? Since a while loop is a general form of repetition control structure any repetition can be done using it (Liang 2001, page 80). To do the equivalent of the above for loop using a while loop we would just need to introduce the counter j explicitly:

```java
int j = 1;
while (j<=3)
    {
        j = j + 1;
        System.out.println(“Hello”);
    }
```

Thus strictly speaking it would seem that for loops are not needed. However they are commonly used which would suggest there is advantage to using them. One reason is that they make a program clearer. The key word for tells the reader of a program that the loop is a counter controlled loop. To see this from the while loop requires examining the whole loop (which for a real program could be a large fragment of code. Furthermore all the detail about the control is on the first line in a for loop – you can see from that one line how many repetitions there will be, how the loop counter changes and so on. This also reduces the chances of programmer bugs: when writing a counter-controlled while loop it is very easy to forget to change the counter for example. A final advantage of using for loops for counter-controlled loops is that it gives more information to the compiler – it tells the compiler what sort of loop it is dealing with. This opens up the possibility of the compiler optimising the code using that fact, so potentially making the resulting program run faster.

In conclusion, for loops are not strictly necessary in theory since anything that can be done with them can be done using a while loop instead. However, in practice they are needed to reduce the possibility of error, make the code simpler and allow the code to run faster.

References
Feedback

It was given 10/10 by the examiner. Why? Notice how the first and last paragraphs are an introduction and conclusion. The conclusion summarises the argument from the middle paragraphs upon which the conclusion is based. Both sides of the argument are considered before the conclusion is draw. Examples are used throughout to illustrate the arguments. The aim of the middle paragraphs is to convince the reader of the validity of the conclusion drawn.

Below we go through this answer paragraph by paragraph pointing out why it was considered a good answer.

A “for loop” is a form of control structure for repetition. It allows a command to be repeated some given number of times. In particular they are used for counter-controlled repetition, where the number of repetitions is known before the loop starts to execute. For example,

```java
for (int j = 1; j <= 3; j++)
    System.out.println("Hello");
```

prints Hello three times. A while loop is also a control structure for repetition. However, it is not intended to be used specifically for counter controlled loops, but for any form of repetition. For example,

```java
while(a <= 10)
    a = a + b;
```

would repeatedly add the value of b to a until the total was more than 10.

This first part sets the scene – it describes the loops the question is about – giving the basic facts that the actual argument will build on. Notice the use of examples to illustrate the points. Many weak students do little more than this and get a fail mark (3/10 perhaps). There has been no discussion yet! So far it has just been introductory explanation of what the question is about.

Are for loops needed if while loops are available? In other words can anything that can be done with a for loop also be done with a while loop? Since a while loop is a general form of repetition control structure any repetition can be done using it (Liang 2001, page 80). Note the citation to a source – this fact was from Liang (though there it is given in a completely different way). To do the equivalent of the above for loop using a while loop we would just need to introduce the counter j explicitly:

```java
int j = 1;
while (j <= 3)
    { 
    j = j + 1;
    System.out.println("Hello");
}
```

The above paragraph gives one argument – a justification of why the answer might be thought to that loops are not needed. An example illustrates the point to make it more convincing and the source acts as extra justification. Too many first years stop here (perhaps with a one line conclusion and get maybe 5/10 total. The next paragraph however, really starts to discuss the point. It starts with an answer to the question that may be drawn if you thought no harder, however it then points out that this cannot be the whole answer – it gives a big “but...”

Thus strictly speaking it would seem that for loops are not needed. However they are commonly used which would suggest there is advantage to using them. One reason is that they make a program clearer. The key word for tells the reader of a program that the loop is a counter controlled loop. To see this from the while loop requires examining the whole loop (which for a real program could be a large fragment of code. Furthermore all the detail about the control is on
the first line in a for loop – you can see from that one line how many repetitions there will be, how the loop counter changes and so on. This also reduces the chances of programmer bugs: when writing a counter-controlled while loop it is very easy to forget to change the counter for example. A final advantage of using for loops for counter-controlled loops is that it gives more information to the compiler – it tells the compiler what sort of loop it is dealing with. This opens up the possibility of the compiler optimising the code using that fact, so potentially making the resulting program run faster.

That last paragraph was the difference between an excellent answer and a mediocre one. It allowed a completely different conclusion to be drawn, refuting the original be drawing on a whole series of facts. If they were from books they should be cited too (which would give them extra weight). They are not isolated facts about loops though – all add weight to the argument that for loops are needed for well-written programs. This got the main 3 or 4 marks and convinced the examiner this student deserved a first.

In conclusion, for loops are not strictly necessary in theory since anything that can be done with them can be done using a while loop instead. However, in practice they are needed to reduce the possibility of error, make the code simpler and allow the code to run faster.

Finally a conclusion is drawn summing up (gaining an extra 1 or 2 marks). What conclusion is drawn matters less than whether it was convincingly justified. With slightly different middle paragraphs it would also be possible to get full marks arguing that for loops were not needed, by putting more emphasis on whether they are needed in theory rather than the practical advantages

References

Note finally that sources are referenced in full – title author, year, publisher and edition are all given for a book. Ideally more than one source would have been consulted – this student was a bit lazy. Note also that the place information from that source appears is cited in the text - … any repetition can be done using it (Liang 2001, page 80). Because this was written in the student’s own words just using facts from Liang, quotes are not used. If an exact quote from a book or some other person is used (e.g. cut and pasted) then it should be in quotation marks and the source cited in the same way.