

# Welcome to Medusa

## Contents

### Quick Start Guide

#### Overview

Key issues with Blackboard grading

#### The Medusa Solution

Key Features

#### Disclaimer

#### Understanding the grading process

Build question in Blackboard

Run Test and download Results File

Use Medusa to generate Answer File Template

Edit Answer File to include Methods

Use Medusa to Grade and Generate PDFs

Check Files for inconsistencies and possible collusion

Upload grades to Blackboard

Distribute PDFs to students

#### The Answer File - Creating Answer File Methods

#### Creating multi-part questions on Blackboard

Current issues:

#### Statistical output

#### PDF file creation

#### The Feedback file Format

#### The (Blackboard) Results Download file


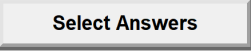
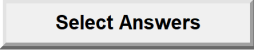



THE UNIVERSITY OF  
**WESTERN**  
**AUSTRALIA**

## Quick Start Guide

[Back to TOC](#)

To get you started quickly on using Medusa, an Answer File ([AnswerFile.xlsx](#)) and a sanitised Results file ([SanitisedResultsFilefromLMS.xls](#)) downloaded from a test created in Blackboard have been provided. To use these files, first place both of them into a new folder (notionally called *myfolder*). Medusa will subsequently place all the graded results into this folder. Next, start [Medusa](#) and from the Graphical User Interface (GUI):

- 1) Click  Button, navigate to *myfolder* containing [SanitisedResultsFilefromLMS.xls](#) and select it. More about results files [here](#).
- 2) Once this file is selected, the  button become visible. Click  navigate to *myfolder* and select [AnswerFile.xlsx](#). More about answer files [here](#).
- 3) Leave all the check Boxes selected press 


This process will run with the progress bar indicating the student. When complete, 3 folder should be created. These are:

**myfolder/ResultsOutput** – This folder will contain all the files graded. It also contains the original answer file ([AnswerFile.xlsx](#)) but contains an additional worksheet with all the methods (equations) included in original answer file which have evaluated (converted into numbers). This is useful to help determine if any of your equation entered into the answer files contained errors.

**myfolder/GraddingIssues** – This folder will contain any students answers which could not be correctly interpreted. These generally need to be viewed by the unit coordinator. In generate, the reason the files cannot be correctly interpreted is that the student entered irrelevant inputs

**myfolder./CollusionCheck** — This folder will contain all any files to be reviewed for possible collusion. files graded

As originally configured, the " **Results Process Parameter**" on the Medusa GUI is set to grade only the first 10 files. Repeat the above process but change the " **Results Process Parameter**" to **all**.

Press  again and now all 99 files contained in the original **SanitisedResultsFilefromLMS.xls** file will be grade.

For reference, the HTML questions and the images associated with each question are also shown here. Use these files to start thinking about how you might develop question in your own course.

## Overview

[Back to TOC](#)

The project grew from a need to support the assessment and feedback to our students at [The University of Western Australia](#) as we more to a greater online learning experience. This system *assumes* you are interested in building complex multi-part Blackboard questions using [Blackboard](#), a process which has been previously discussed elsewhere. Complex multi-part questions (which have say Parts a to f) are interconnected questions which demonstrate the ability to solve a larger (real-world) problem, taking on-board all the information provided. Such question styles are required, especially towards the end of a unit, in order for students apply, analyse, synthesize and evaluate ([Levels 3-6 of Bloom's Taxonomy](#)) information through processes they have learnt throughout the unit. Typical Blackboard (and indeed most LMS systems) only ask isolated, short answer type questions - as soon as randomisation of a question bank is used in order to reduce instances of collusion, it is no longer possible to create interconnections between the different short answer questions offered in Blackboard (the randomisation breaks any links).

## Key issues with Blackboard grading

Key problems with grading using LMS specifically for engineering/science units (which generally require units and application of algorithmic methods to a problem) are:

- It does not allow for a range of student inputs. For example, answers of 0.002A, 2mA,  $2 \times 10^{-3}A$ , 2e-3A and even 2e-6kA should all be marked as correct for an answer of 2mA. Experience shows that students can use such expressions, sometimes simply to try to break the system. Blackboard does allow for regular expressions which can pattern match to these and more details are available about these features, however significant effort is required for every instance of an input to catch such entries. Such effort is largely a waste of time for the unit-coordinator and graders as the effort needs to be repeated (and tested) for every new question.
- Blackboard does not take into account follow-on (carry-forward) mistakes by the student. Where a mistake is made early in a multi-part ([multiple fill in the blank](#)) the entire problem is marked as wrong.
- As a result of the 2nd point, Blackboard largely encourages the use of single, short answer type questions. However such questions cannot be connected together when they are added to a question pool and then selected at random, an essential element to minimise collusion in on-line, non-invigilated (non-proctored) tests.
- it does not provide personalised feedback to the students. Where a random pool is used, only a generic answer method can be provided to the student.
- the blackboard questions cannot be checked for collusion easily

**This project** provides a method to automate grading of complex multi-part questions used in the BlackBoard Learning Management System. These multi-part questions are discussed further in the section [Creating multi-part questions on Blackboard](#), and are built using the [multiple fill in the blank](#) type question in Blackboard. This project developed a program which can grade complex multi-part Blackboard questions (after they have been answered) and the results [downloaded via the grade centre](#). The program is designed to meet the needs of engineering and science based units.

## Key Features

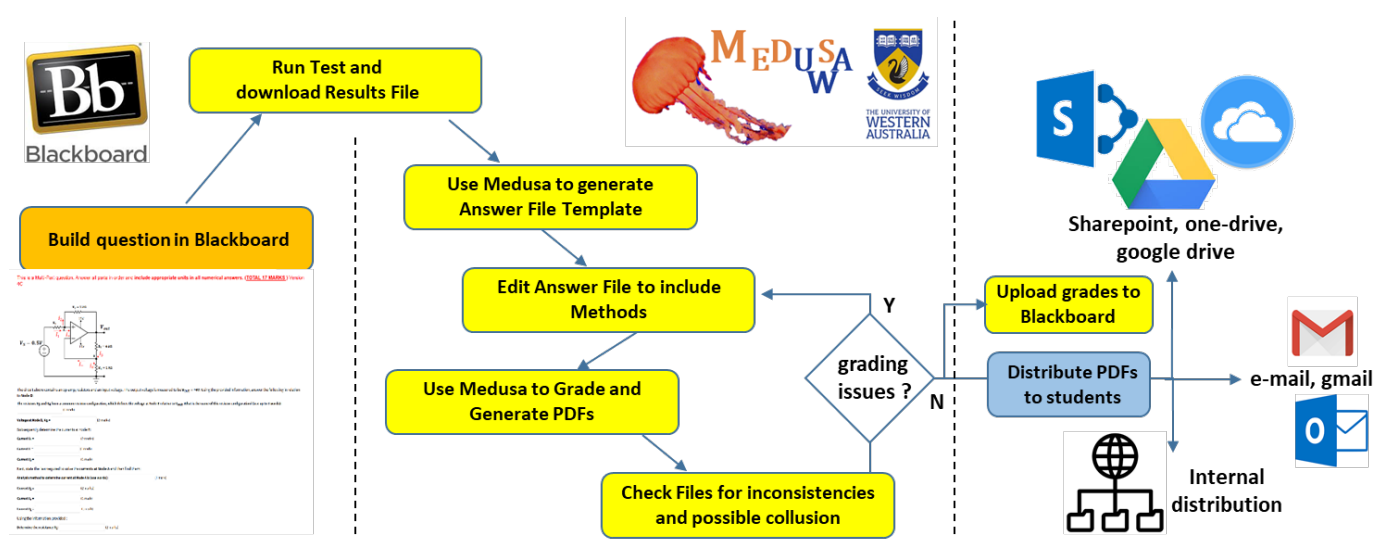
The key features of this grading program are:

- Data input is accepted with a range of SI units (A, Amps or Amperes) and a range of prefixes (mA,kV). Units can be combined using /,.,\* and ^ operators to form units such as m/s, m.N or kg.m/s^2. Prefix can be used but only for the first unit, so for example mm.N (millimetre times newton) would be accepted as an answer from a student but mm.mN (millimetre times millinewton) will not. Medusa does it's best to flag issues with content it cannot interpret and moves such files into a ./GradingIssues directory for checking but the unit coordinator.
- The [answer file](#) specifies the method to solve. Follow-through (carry-forward) marks are awarded if the student applies the correct method. Solutions are checked for the accepted answer as well as the answer based on a correct method applied to previously wrong answers. The feedback provided to students tells them the answer was wrong but such consideration was taken into account and correct marks awarded where appropriate. This feature can be turned off but it is discouraged to do that.
- Feedback is provided if students are out by factors of 10,100, 1000.
- Feedback is provided where units are wrong or missing and marks awarded accordingly.
- For number based answers, the magnitude, sign and units are all checked and can each be assigned marks separately.
- The letter o and O when found before other numbers are considered to be typos and converted to ZERO (0).
- Numbers are accepted in a variety of formats. A value of 0.0123A can be accepted as 12.2mA, 12.3e-3A, 12.3x10^-3A and even 12.3e-9MA.
- Different rubrics can be assigned to different questions. Number based problems and word/sentence based answers have separate rubrics when grading.
- Each part of every question can be assigned a different weight
- A pdf is generated for each student with detailed feedback for each part of the question
- A personalized histogram is created for each student, along with statistics for the unit (perhaps the best way to have students learn statistics is to provide such information)
- Will grade N questions from a question-bank (pool) of M questions where  $N \leq M$  (for example a question bank may have  $M=10$  questions of which students are randomly assigned  $N=5$ )
- Text based answers can have multiple answers including a regular expression, for example you can input any number of text based answers such as "KCL" and "Kirchhoff's Current Law" and/or include a regular expression such as "Kirch([h])?of([f])?[\W]?[s]? Curr[ea]nt Law[s]". All these forms would all be accepted as correct for answer requiring identification of Kirchhoff's Current Law. For more information on forming and testing regular expressions, see [here](#).
- Runs a collusion check against all student answers. Specifically, it checks for any student that answers questions that they were not assigned, for example, where a student gets a question largely *correct* however it was not one of the questions from the random question bank (pool) they were assigned. This suggest the student may have sat next to someone and simply copied their answers into their text entry fields. Such instances are flagged to the unit-coordinator to investigate and possibly interview the students involved. answers a question

This is an open source project and **no claims are made about the accuracy or validity of the code** including, but not limited to, performing grading and giving feedback. This work is not supported by BlackBoard and any changes or updates to Blackboard may not be supported by the current version of Medusa. The code is not to be used for purposes for which it was not designed without the express permission of the author. Unit coordinators should in all cases check the output provided and consider possible errors that might arise either from the code it's self or from the files that it inputs. Students should be allowed to review and comment on the grade produced.

## Understanding the grading process

This grading process is designed to be not only to be simple but also reproducible and traceable. This is important for accreditation of courses and units, where evidence need to be provided on the methods of grading and the sample outputs showing poor, average and excellent performance. The process is broken into a number of steps which are described below and correspond to the flow-boxes in the illustration below:



### Build question in Blackboard

Create images and text for your multi-part question on Blackboard. While doing this you generally work through the solutions method to get to the right answer. Trial the test with yourself and colleagues. When creating each question ensure that there are multiple version of each question. A good rule of thumb is that if there are  $N$  students in your course and you have  $P$  questions you want to create multiple version of, then you need around  $\sqrt[P]{N/4}$  different versions of each question to reduced/trace any evidence of collusion. Or example, with  $N=221$  students and with  $P=3$  questions that I want to randomize, then I need 3.81 or  $\sim 4$  versions of each question. When creating the question it is essential that the text of each question is different as Medusa determines which question each student sat by evaluating the actual text of the question. So assuming we create 4 different questions (students randomly get one of these 4) and each question has a different image containing different circuit values, the question might go:

- **Question bank Q1**  
Determine the value the current from the image ? Version1
- **Question bank Q2**  
Determine the value the current from the image ? Version2
- **Question bank Q3**  
Determine the value the current from the image ? Version3
- **Question bank Q4**  
Determine the value the current from the image ? Version4

Now students are savvy and may notice they each receive a different question. If you don't want them to notice you can do one of two things: 1) reduce the font size of the words "VersionN" so that the version is not noticeable or 2) make the font colour of the words "VersionN" so that the version is not visible. In both cases the test when download from Blackboard will be unaffected and Medusa will work fine in determining which question was answered



## Run Test and download Results File

Run the test as normal on blackboard. As Blackboard does a poor job of grading Engineering/Science based question we recommend turning off any feedback and point scoring to the students after the exam. Medusa allows rapid grading and detailed feedback, and it is best not to confuse students with providing feedback via blackboard and Medusa. To do this, go to Test Setup and change the "SHOW TEST RESULTS AND FEEDBACK TO STUDENTS" as indicated below (all options off). Also ensure that the grade column for the test is unselected. After deploying the test, go to the grade centre and ensure the column for the test is hidden. This will be unhidden latter when grades are uploaded to Blackboard, but showing the grade column may result in some confusion with students if Blackboard attempts to grade the test (as it will do a poor job here, the student grades will be lower than expected when using Medusa)

### SHOW TEST RESULTS AND FEEDBACK TO STUDENTS

Test results and feedback are available to students after they complete a test. Set up to two rules to show results and feedback. Rules occur based on the events selected. Each rule specifies when and what to show students; such as scores, answers, and feedback for each question.

WHEN ⓘ	SCORE PER QUESTION ⓘ	ANSWERS ⓘ	FEEDBACK ⓘ	SHOW INCORRECT QUESTIONS ⓘ
After Attempts are graded ⌵				
Test results and feedback will be available to students after all students enrolled into the unit are graded.	<input type="checkbox"/>	<input type="checkbox"/> All Answers <input type="checkbox"/> Correct <input type="checkbox"/> Submitted	<input type="checkbox"/>	<input type="checkbox"/>

After the test is completed download the [results file](#). We recommend placing the results file in a new directory as all the results will be generated in the directory where the [results file](#) is found.



## Use Medusa to generate Answer File Template

After the [results file](#) has been downloaded start Medusa, click the [Select Results](#) button and navigate to the folder where the [results file](#) is found. Medusa can accept a number of different file formats such as \*.xls, \*.xlsx and \*.csv for the [results file](#). Once loaded, the [Select Answers](#) button is still disabled. Press the [START](#) button and Medusa will ask you if you want to create an [answer file](#) from this [results file](#). Select Yes and after a few seconds you will be instructed as to where to find the [answer file](#). The [answer file](#) created at this stage should not be used or grading it contains the most common values of answers and up to 12 of the most common units that students entered as answers. You can use this information to determine what units you will accept and to learn more about what units students indicate are acceptable – this may help you to reflect on the teaching/learning in your course.



## Edit Answer File to include Methods

The [answer file](#) needs to be edited not only to place the correct answer values and all the acceptable units, but most importantly to enter the methods to solve the problem. Variables have been place into the file as Var1=a, Var2=b, Var3=c, Var4=d. Change these as required in your question (for example change Var1=a to R1=100). Add or remove these as required. Next, in each of the answers ANS1 to ANSn, go through and enter answers as numbers or methods. Methods are written in the cell to the right of ANS4 so for example, we might find the method ANS2/7+R1 which indicates that for answer #4, use answer #2, divide it by 7 and add the number assigned to the variable R1. This process make it easy to create a range of solutions or multiple versions of your test. It also




makes the grading process highly reproducible. After editing the methods, make sure you assign the correct Rubric and weighting to each problem. There are currently only 2 Rubric types:

- **num** - for engineering number based answers. Numbers can assign a grade to the value, unit and sign. The magnitude is always checked by Medusa first. If the magnitude is wrong, the question is graded as incorrect. If the magnitude is correct, then the sign and units are subsequently evaluated. In this way it is not possible to obtain a mark for just entering units correctly in an answer. If you want to enforce the sign and unit being right, with -0.5 or each component, then set up as the "num" Rubric as (magnitude=0, sign=0.5, unit =0.5). The default "num" Rubric created in the [answer file](#) template uses (magnitude =0.333, sign=0.333, unit =0.333) which assigns equal weight to signs, magnitude and units.
- **sentences** - which includes single and multiple words as an answer. Sentences are graded as either 0 or 1.

All Rubrics must add to one and are forced to do so in the program, so your results may be unexpected if you do not ensure each rubric sums to one (1). If Question1 part 3 has a total possible point score of 2, just set the weight column value to 2 for that part of the question. The final grade is the weight column associated with that part of a question multiplied by the evaluated Rubric for that part.

### Use Medusa to Grade and Generate PDFs

Once the [answer file](#) has been edited to the final (or near final) form, load up Medusa, click the  button and then selecting the [answer file](#) just created. Ensure to change the "**Results Process Parameter**" on the Medusa GUI to a low number like 10. This will ensure you do not waste time waiting for the results from a large class to be graded while you are in the process of checking for answer file. We also recommend you turn off "**Generate PDFS for each graded result (in ./ResultsOutput)**" as this can waste time as well. If you do this also ensure that "**Remove HTML and PNG (histogram) files generated (in ./ResultsOutput)**" is turned off as you want the HTML files to remain so you can evaluate the output. You should also turn off "**Run a collusion check on all results (in ./CollusionCheck)**" while you are refining the grading process. Once you have got the process well refined, you can grade all the students by setting the "**Results Process Parameter**" to "**all**" (not with quotes just the word **all**) and then turn on the "**Generate PDFS for each graded result (in ./ResultsOutput)**". This will then grade all the students, producing a pdf file for each student ID and an [LMSUpload.txt](#) file for the graded test. Subsequently, if you want to grade a specific student, enter just their student ID in the "**Results Process Parameter**" text entry box and just this student's grades will be re-analysed.

### Check Files for inconsistencies and possible collusion

The final process is to check a random selection of PDF files to any issues. Where Medusa had problems identifying the downloaded data from Blackboard it will place the student files to be checked in a "GradingIssues/" directory (with the letter M in front of the student ID name for the pdf filename. Inside the file, the yellow highlighted sections are the ones the program could not grade. In most cases grading issues result from random text entered by students. Medusa assigned a grade of zero (0) to such entries which is appears reasonable. If this is the case then move onto the next file until all are checked. It is also recommended to turn on "**Run a collusion check on all results (in ./CollusionCheck)**" at the final stages of analysis. Any files to be checked will be placed in a "**./CollusionCheck**" directory. **The program currently check if students have answered questions and got them correct but were not actually assigned the question.** This can be considered **post-invigilation (post-proctoring)** and is perhaps a more realistic method of ensuring text integrity than having someone present to watch over as the test is taken. Specifically, the collusion check looks for any student that answers questions that they were not assigned, for example, where a student gets a question largely *correct* however it was not one of the questions from the random question bank (pool) they were assigned. This suggest the student may have sat next to someone and simply copied their answers into their text entry fields. Such instances are flagged to the unit-coordinator to investigate and possibly interview the students involved.



## Upload grades to Blackboard

When grading is completed by Medusa in addition to other files it creates a [LMSUpload.txt](#) file in the ./ResultsOutput directory which contains 2 comma separated columns, one labelled **Username** and one labelled **LMS\_Grade**. The Username corresponds to the student ID which Blackboard recognises during an upload. The other column (**LMS\_Grade**) contains the grade for each student out of the total possible marks for the test (not a percentage). You should edit this file to change the columns name **LMS\_Grade** to the corresponding column name of the test which the students just sat. This file can be uploaded to Blackboard and will replace the grades in the column indicated with these grades. Once uploaded, the grade column should be unhidden so that student can now see their grades. To help student with their understanding, you should also [Distribute PDFs to students](#).

### Distribute PDFs to students

The final step is distribution of the pdf files to students, all of which are located in the ./ResultsOutput directory. This distribution of PDF files needs to be handled at an institutional level and each institution has different methods for distributing individual assessments back to students. The Medusa team cannot assist with that process. Best to contact IT within your department to assist.

## The Answer File - Creating Answer File Methods

[Back to TOC](#)

While it is always possible to get to the solution via multiple methods, Medusa allows at this time only a single method. This allows the use of previous data entered by the student to be used to recalculate the expected answer using their (previous incorrect) entered values. By comparing their entered answer against the method, you can check if they applied the correct thinking at that stage of the problem and award marks accordingly.

In the Answer file a typical question might look something like the one below. Notice that for answer#2 indicated by the cell to the right of **ANS2**, the cell contained  $[R2]+[R3]$ . The square brackets tell Medusa to use defined variables to solve this problem. Since R2 and R3 have been defined above (as 100 and 200 respectively) then answer to #2 is 300. The units columns have values separated by the symbol |, which indicate that acceptable units would be  $\Omega$  or Ohm or V/A. The option  $[oO]hm[\backslash]? \Omega || Ohm|[oO]hm[\backslash]?[s]? V/A$  is a regular expression which allows much more flexibility in the allowed units. This expression additionally allows any of the following units: ohms, ohm, Ohm, Ohms, ohm's, Ohm's. However if you don't want to learn regular expressions just type out all the possible variations you want to allow. So the answers allowed are:

300  $\Omega$ , 300 ohms, 300 ohm, 300 Ohm, 300 Ohms, 300 ohm's, 300 Ohm's V/A

Looking Further we see that answer#4 (the cell to the right of **ANS4**) is  $1/(1/[R1]+1/[QUE1ANS2])$ . This answer method uses  $R1=300$  as well as whatever answer the student entered for Question#1 (indicated by the prefix **QUE1**) answer #2 (indicated by the **ANS2** term. Medusa first attempts to grade the student of the primary correct answer, but should they get that wrong, it then uses their answer to part #2 and evaluates in the answer to part #4 is correct. If it is, it awards the full marks to the answer #4. Since we are actually evaluating Question #1 we don't need the prefix **QUE1** to refer to answer #2. This can be seen in the method used for answer #5 (cell to the right of **ANS5**) which uses:  $[V]/[ANS4]$ . Since we are in question#1 we can just refer to part #4 using **ANS4** so the correct answer here is the voltage  $V=30$  divided by whatever they gave as the answer to part#4. The use of **QUEn** where n is the question number is particularly useful if you give a common question to all student but then want to refer back to some answer provided in that question.

ID	Type	Parameters	Values	Range	Units	Rubric	Weight	Comments
Title	Mid-Semester Online Test, Motion ENSC2001, Semester #1, 2020							
Rubric1	Num	sign	0					
Rubric1	Num	magnitude	1					
Rubric1	Num	units	0					
Rubric2	sentence	all	1					
Q1	Q	Text or Question#1.....						
Q1	V	V	30		V			
Q1	V	R1	300		ohm			
Q1	V	R2	100		ohm			
Q1	V	R3	200		ohm			
Q1	A	ANS1	C c			Rubric2	1	
Q1	A	ANS2	$[R2]+[R3]$	"5%"	$\Omega    Ohm [oO]hm[\backslash]?[s]? V/A$	Rubric1	1	
Q1	A	ANS3	1			Rubric2	1	
Q1	A	ANS4	$1/(1/[R1]+1/[QUE1ANS2])$	"5%"	$\Omega    Ohm [oO]hm[\backslash]?[s]? V/A$	Rubric1	1	
Q1	A	ANS5	$[V]/[ANS4]$	"5%"	A Amp Amps amp amps	Rubric1	1	

## Creating multi-part questions on Blackboard

[Back to TOC](#)

Blackboard can save downloaded [results file](#) as \*.csv (comma separated files) and \*.xls files (tab separated files). The Blackboard format for the \*.xls does not appear to adhere to the standard Excel™ format and Excel™ typically complains about opening such files (but does it anyway). In some cases you may have opened such files and then either save in Excel's official \*.xls for \*.xlsx (newer) file format. As a result there are potentially 4 different types of file formats the [results file](#) may be in. In all these cases Medusa is robust enough to figure it out and should be able to open any of these types of files for the [results file](#). It is essential however that the files are downloaded as By User and



not by Question and User as Medusa cannot read the latter type file format. For more details of this see the section on [Build question in Blackboard](#).

The Figure shown is a screen shot of a typical multi-part question with 13 interconnected parts, each with separate assigned point value for a total of 17 marks. This question is supported by the Blackboard [multiple fill in the blank](#) type question format. It is recommend to start by writing out the question and answers on paper. Then create images and text for your multi-part question on Blackboard by selecting the [multiple fill in the blank](#) type questions. Each entry is simply is treated as a parameter defined by square brackets. If you need 3 parts to a question where the student enters the value of the current for each then the question might read:

**Determine the current through R1:** [I1] (1 mark)

**Determine the current through R2:** [I2] (1 mark)

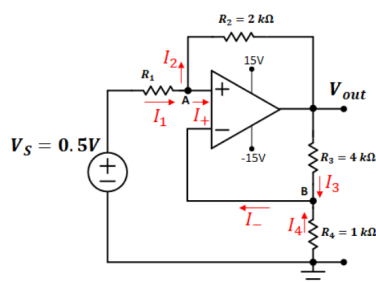
**Determine the current through the inductor in the steady state:** [Iss] (1 mark)

Note the parameters used above are **I1**, **I2** and **Iss**. These can be any parameters, just so long as every question part uses a different parameter. The question asks “do you want to assign partial credit?” The response here is not important as Medusa ignores this option. Also, the next page on this question format the expects you to enter an answer for each parameter used (**I1**, **I2** and **Iss** in the example above). Enter any random number in each answer box here and then when you close the question and deploy the test, ensure to turn off the options to show any answers for point score to the students as described in [Run Test and download Results File](#). Also ensure the column in the grade centre is hidden until final grade upload. Medusa does the grating offline after [downloading the results file](#) and when done, Medusa produces an Upload.txt file which can be uploaded to Blackboard. Once uploaded to the correct blackboard column in the grade centre, ensure you enable the grade centre column so that all students can see their final mark.

Question 4

17 points Save Answer

This is a Multi-Part question. Answer all parts in order and include appropriate units in all numerical answers. (TOTAL 17 MARKS ) Version 4C



The circuit above contains an op-amp, resistors and an input voltage. The output voltage is measured to be  $V_{out} = +4V$ . Using the provided information, answer the following in relation to Node B:

The resistors  $R_3$  and  $R_4$  form a common resistor configuration, which defines the voltage at Node B relative to  $V_{out}$ . What is the name of this resistor configuration? (use up to 3 words):

(1 mark)

Voltage at Node B,  $V_B =$  (2 marks)

Subsequently determine the currents at node B:

Current  $I_4 =$  (2 marks)

Current  $I_1 =$  (1 mark)

Current  $I_3 =$  (1 mark)

Next, state the law required to solve the currents at Node A and then find them:

Analysis method to determine current at Node A is (use words): (1 mark)

Current  $I_2 =$  (2 marks)

Current  $I_+ =$  (1 mark)

Current  $I_1 =$  (1 mark)

Using the information provided :

Determine the resistance  $R_1$ : (2 marks)

Determine the Closed Loop Gain for the amplifier,  $A_{CL}$ : (1 mark)

Determine the maximum positive OUTPUT voltage for this amplifier: (1 mark)

Determine the INPUT voltage that produces the maximum positive OUTPUT voltage for this amplifier: (1 mark)

## Current issues:

While Medusa is robust there are some instances where it fails. This can happen when:

- 1) If a student enters a comma (,) as an answer. The downloaded file is a list of comma separated entries for each answer in a [multiple fill in the blank](#) type question. This is true whether you download the file as a tab separated or comma separated file. So, if a student enters a comma (,) as an entry this can mess with the programs ability to determine the boundary start and end of each part of the question. So **do not ask questions that require a comma as an entry.**
- 2) Equally important it that if a pull down list of answers is provided ([jumbled sentence](#)) type question is asked, do not allow any response to include a comma. If you must include a comma, ensure it is followed by a space as all commas in sentences treated correctly if they have a space after the comma (as expected in a written sentence).

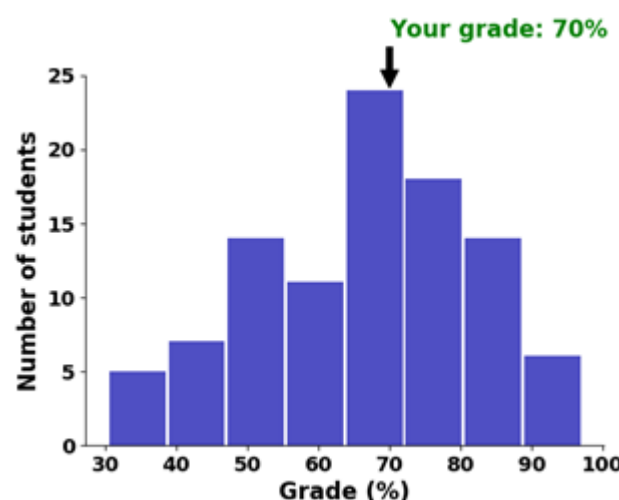
## Statistical output

[Back to TOC](#)

After grading the [results file](#) the HTML and PDF files created contain a personalised histogram showing the students and spread of grades in the class and their grade, specifically pointing to where it occurs in this distribution. This achieve 2 goals:

- 1) Students see their data presented in statistical form. If they don't understand it, they are encouraged to ask another student or the unit coordinator how to interpret the data. In doing do we are embedding and encouraging enquiry about statistics, a strong driver in engineering and science based courses
- 2) Students can see how they are tracking in the unit. They can use this as an opportunity to approach the unit coordinator if they are looking for approaches and study methods that can help move them further to the right on this plot

Additional summary statistics included in the HTML and PDF documents are the average, median and standard deviation for the unit. A brief explanation if provided in those documents about how to interpret this information.



## PDF file creation

[Back to TOC](#)

The PDF file creating is based on the wkhtmltoimage.exe 0.12.5 (with patched qt), which is an open source project. The [wkhtmltoimage](#) executable was packed into the Medusa.exe file for convenience. After the HTML and statistical histograms are generated by Medusa, a PDF file will be created based on the HTML file if the option:

☒ Generate PDFS for each graded result (in ./ResultsOutput)

has been chosen at the main Medusa GUI screen. Note the pdf generation can take several minute where a large number of pdf files are being generated. It is suggested that this option is not selected until all grading issues have been resolved, as this will make more efficient use of your time. Do not contact the wkhtmltoimage team for issues related to PDF generation by Medusa. All comments and feedback need to come through to the Medua team.

## The Feedback file Format

[Back to TOC](#)

The feedback file refers to the [FeedbackReport.html](#) file that appears in the same directory as the Medusa.exe file. This [FeedbackReport.html](#) can be adapted for various institutions to suit their needs. In order to edit this file, there are key variables which must be understood within the [FeedbackReport.html](#) file. These keyword variables are indicated below

Feedback File Variable	Description
Name	the first and last name (separated by a space) for the person sitting the test
UserID	The identification number (student number) of the person sitting the test. Note that if the Results File is resaved in another format (such as .xlsx) it is essential to ensure this column has been designed as a TEXT column and not a Generic or Number Column as any leading zeros in UserIDs would be lost. For example, UserID 001234 would become UserID=1234.
Median	This is the total mean for the Medusa analysis that was run as a percentage. Note that if the <Results Process Parameter> text entry box on the Medusa GUI was set to 'all' this would be the mean for the test. If only a section of students were graded, this mean would only represent the mean of the subset of students
Mean	This is the total mean for the Medusa analysis that was run as a percentage. Note that if the <Results Process Parameter> text entry box on the Medusa GUI was set to 'all' this would be the mean for the test. If only a section of students were graded, this mean would only represent the mean of the subset of students
Stddev	This is the total standard deviation for the Medusa analysis that was run as a percentage. Note that if the <Results Process Parameter> text entry box on the Medusa GUI was set to 'all' this would be the standard deviation for the test. If only a section of students were graded, this standard deviation would only represent the median of the subset of students
GradedDate	This is the date that Medusa was used to create the graded file output
Grade	The sum of the points awarded for this test
GradeTotal	The sum of the total possible points which could be awarded for this test
GradePct	The percentage awarded for this test ( $100 * \text{Grade} / \text{GradeTotal}$ )
Qn	This identification number for each Question (1 through to N)
SectionPart	This is the first 200 words of the question that was asked followed by the words "... See Original LMS Question for full question details and images"
SectionGrade	This is the actual points which were awarded for in each Question
SectionPossible	This is the maximum number of points which can be awarded in each Question
Test_Title	The name of the test. This parameter is taken from the row name "Title" in the Answer File
Image_Filename	unused but set to load image1.png. This might be useful if you want to place your institution's logo on the graded HTML/PDF output

## The (Blackboard) Results Download file

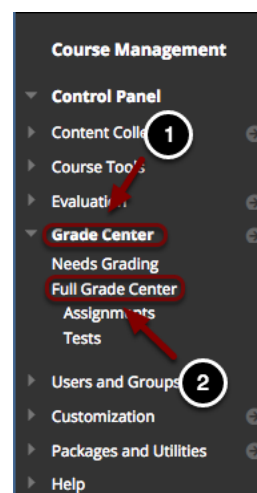
[Back to TOC](#)

To create the downloaded result file from a test completed by students that is used by Medusa for grading an on-line assessment:

Log into your Blackboard course and go to the **Control Panel**:

1. Click on Grade Center.
2. Select Full Grade Center.

Once in the grade center, locate the grade column for the test in the grade center. Click on the chevron in the column header, and select **Download Results** from the menu.



You will now see a screen labeled **Download Results**. To download results of the survey,

1. Select the delimiter type (comma or tab). The recommended setting is Tab.
2. **Format Results:** Select how to format the results download. **For Medusa to operate correctly is is essential that the format of the results MUST be By User only**
3. **Attempts to Download:** Select which attempts to download. The setting should be set to **Only Valid Attempts**.
4. Click on **Click to Download Results**. Your browser will now ask you where to save your results to. Select a location on your computer. Save this file somewhere other than the standard <downloads> directory. This file is required by Medu<sub>U</sub><sup>S</sup><sub>W</sub><sub>A</sub> to operate

Grade Center : Full Grade Center

When screen reader mode is on, the Grade Center data appears in a simplified grid. You cannot freeze columns or edit inline, making it easier to navigate using the keyboard. To enter a grade, access a cell's contextual menu and click **View Grade Details**. When screen reader mode is off, you can type a grade directly in a cell on the Grade Center page. To enter a grade: click the cell, type the grade value, and press the Enter key to submit. Use the arrow keys or the tab key to navigate through the Grade Center. If you are using a MAC and you do not have scroll bars, please click [here](#). If you are using Windows, and you do not have a vertical scroll bar, please press the CTRL and - key.

More Help

Create Column Create Calculated Column Manage Reports Filter Work Offline

Sort Columns By: Layout Position Order: Ascending Hide Color Coding

Grade Information Bar

LAST NAME	FIRST NAME	SAMPLE SURVE	ASSIGNMENT 2	SUMMER SCOR	AVERAGE SCOR	WORLD HISTOF
student	Demonstration	--	--	--	62.08955%	
Walters	Anthony	--	--	--	5.88233%	
Online2	UT	--	--	--	800.00%	
Online30	UT	--	--	--	625.00%	
Online31	UT	--	--	--	700.00%	
Online32	UT	--	--	--	300.00%	
Online4	UT	--	--	--	990.00%	
Online5	UT	--	--	--	180.00%	
Online6	UT	--	--	--	--	
Instructor_Preview	Demonstration	--		--	363.33333%	
Walters_PreviewUs	Anthony	--		--	70.58823%	

Selected Rows: 0

Move To Top Email

Icon Legend

Edit Rows Displayed

Click on the chevron in the column header

Select Download Results

Quick Column Information  
Send Reminder  
Edit Test  
View and Add Alignments  
Grade Attempts  
Grade with User Names Hidden  
Item Analysis  
Attempts Statistics  
Download Results  
View All Attempts  
Grade Questions  
View Grade History  
Edit Column Information  
Column Statistics  
Set as External Grade  
Hide from Students (on/off)  
Clear Attempts for All Users  
Sort Ascending  
Sort Descending  
Hide from Instructor View

## DOWNLOAD RESULTS

Select the delimiter type for the downloaded results for this test. Comma-delimited files (.CSV) have data items separated by commas. Tab-delimited files (.TXT) are text files that have data items separated by tabs. Both are common types of data files and can be opened in most editing software. Tab-delimited files can be opened in Microsoft Excel but must be saved as TXT files. Comma-delimited files need to be imported for use in Excel and must be saved as .CSV files. Saving the file in another format will make the file unreadable by the system when uploading.

- ☐ Comma
- ☒ Tab

1

Question text and results will download for all question types. Unsupported question types will be noted.

Choose a download format. The format listed By User will include all of the questions for a user in one row. The format listed By Question and User will list each question for each user in a separate row. Choose the format By Question and User for assessments longer than 40 questions.

All attempts for this item may be downloaded under All Attempts. Downloading Only Valid Attempts will just include the attempt that is being graded. For example, if the grading option is Last Attempt then only the last attempt will be provided. If the Grading option is Average, all attempts will be provided.

- Format of Results ☒ By User ☐ By Question and User
- Attempts to Download ☒ Only Valid Attempts ☐ All Attempts

2

3

4

Cancel

Click to download results

The results file downloaded from Blackboard has a table format, with each entry separated by commas (example [CSV file](#) and a viewable formatted [HTML](#) version). The header are:

Pattern	Identifier from Blackboard download	Description
unique	<b>Username</b>	the identification number (student number) of the person sitting the test
unique	<b>Last Name</b>	the last name for the person sitting the test
unique	<b>First Name</b>	the first name for the person sitting the test
repeats for each question sat ↑ ↓	<b>Question ID 1</b>	Identify for the Question Number
	<b>Question 1</b>	Identify for the Question Number
	<b>Answer 1</b>	Comma separated list of the answers provided by the person sitting the test. This list is enclosed within double quotes (")
	<b>Possible Points 1</b>	Possible points to be awarded (ignored by Medusa)
	<b>Auto Score 1</b>	Auto Score (ignored by Medusa)
	<b>Manual Score 1</b>	Manual Score (ignored by Medusa)
repeats for each question sat ↑ ↓	<b>Question ID 2</b>	Identify for the Question Number
	<b>Question 2</b>	Identify for the Question Number
	<b>Answer 2</b>	Comma separated list of the answers provided by the person sitting the test. This list is enclosed within double quotes (")
	<b>Possible Points 2</b>	Possible points to be awarded (ignored by Medusa)
	<b>Auto Score 2</b>	Auto Score (ignored by Medusa)
	<b>Manual Score 2</b>	Manual Score (ignored by Medusa)
	.	
	.	
	.	
repeats for each question sat ↑ ↓	<b>Question ID N</b>	Identify for the Question Number
	<b>Question N</b>	Identify for the Question Number
	<b>Answer N</b>	Comma separated list of the answers provided by the person sitting the test. This list is enclosed within double quotes (")
	<b>Possible Points N</b>	Possible points to be awarded (ignored by Medusa)
	<b>Auto Score N</b>	Auto Score (ignored by Medusa)
	<b>Manual Score N</b>	Manual Score (ignored by Medusa)

These patterns continue for Questions 1,2,3,4 ...as many as sat by each student (all students sit the same number of questions in a test even if there are many more questions which are drawn from in the larger Question Bank (pool)).