Exams by e-assessment : Long-term movement or short-term reaction ?

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Subject of the Talk

- The evolution (and de-evolution ?) of the role of computerized assessment in some mathematics courses at Manchester, during 2019 – 2022.

The University of Manchester

- 40 000 students
- 12 000 staff
- 229 Buildings, 50 000 rooms

- History Dating to 1824
- 25 Nobel Prize Winners

- 31 "Departments"

Department of Mathematics

- 90 academics

- 1000 UG students

- 150 PG students

- Alan Turing

- Horace Lamb

- etc

Service Teaching

- Teaching of Maths to students in other departments
- Mechanical, Aerospace and Civil Engineering
- Electrical and Electronic Engineering
- Physics and Astronomy
- Chemistry
- Materials

- Foundation year

History of e-assessment

- 1990s : Some use of "complete packages" brought in from elsewhere e.g. Topclass, CALM etc.

- 2000s : Question Mark for Windows, WebCT

- STACK :
  - 2008-09 : First use with students
  - Several Upgrades
  - 2019-20 : Connection through Blackboard

- Coursework Tests

- Mainly for students taking service course-units

Some units to consider

- MATH19801 : 0B1 : Semester 1 : Calculus and algebra to Foundation Year Students.

- MATH19662 : 1M2 : Semester 2 : Calculus and Linear Algebra to 1st year Mechanical, Aerospace and Civil Engineering Students.

- MATH29681 : 2E1 : Semester 1 : Laplace Transforms, Vector Calculus and Linear Algebra to 2nd year Electrical and Electronic Engineering.

2019 and earlier : Era of blissful ignorance

- Typical Lecture course
  - Two lectures and one tutorial per week.
- Some coursework using STACK or Blackboard
- Exams in traditional format

Coursework 2019

- MATH19662 : Two STACK assignments. Best practice plus single assessment carried out at flexible time

- MATH19801 : Diagnostic followup using STACK. Fortnightly 10 minute written quizzes at end of tutorial.

- MATH29681 : Two STACK assignments.

March to June 2020

- Quick move online. No in-person events.

Coursework Early 2020

- MATH19662 : Coursework 1 : As normal.

- MATH19662 : Coursework 2 : Island of normality !

Exams June 2020

- Cancelled.
- Replaced by formative exercise with low takeup. No e-assessment involved.

Academic Year 2020/21

- All students taught online. Videos and review sessions etc.

Coursework : Autumn 2020

- MATH19801 : Diagnostic Followup continued as normal. Other tests converted to online : STACK.

- MATH29681 : Two pieces of coursework online : STACK.

- Reasonable time-windows : practice available : randomized coefficients.

MATH19801 Question from 2019

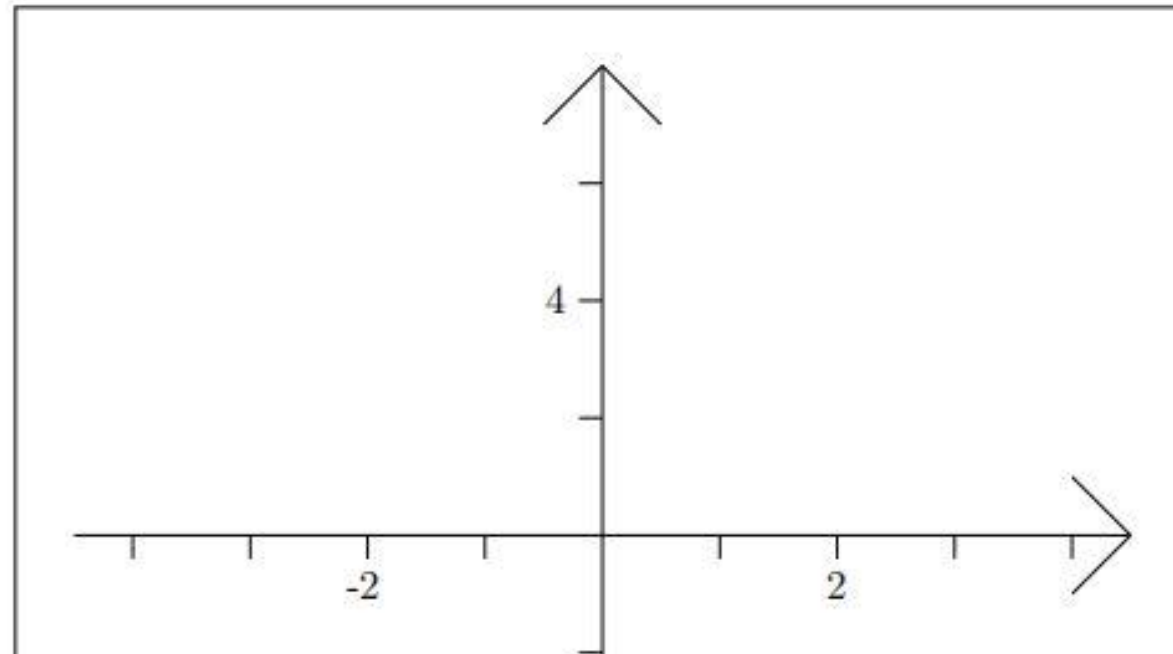1. Express $\dfrac{-3y^2 + 2y + 1}{y^2(y+1)}$ in partial fractions form.

Mark ____ / 3

MATH19801 Question from 2019

2. Plot a graph of the function $r(x) = x - 4/x^2$ on the axes below. Note features such as axis crossings, asymptotes, stationary points etc.
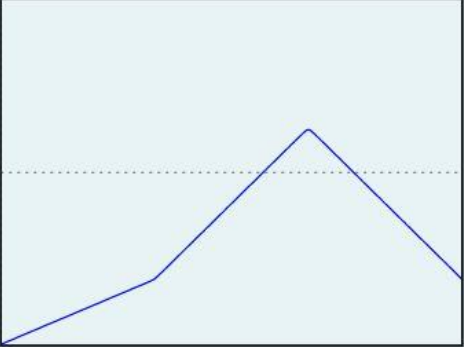
working

MATH19801 Question from 2020

- .

Question **2**
Not yet answered
Not graded
⚑ Flag question
⚙ Edit question

Plot a rough sketch showing the function below and its derivative.

Tidy STACK question tool | ❗ Question is missing tests or variants.

Put an answer of 1 to indicate that you will upload a scan below

Question **3**
Not yet answered
Marked out of 1.00
⚑ Flag question
⚙ Edit question

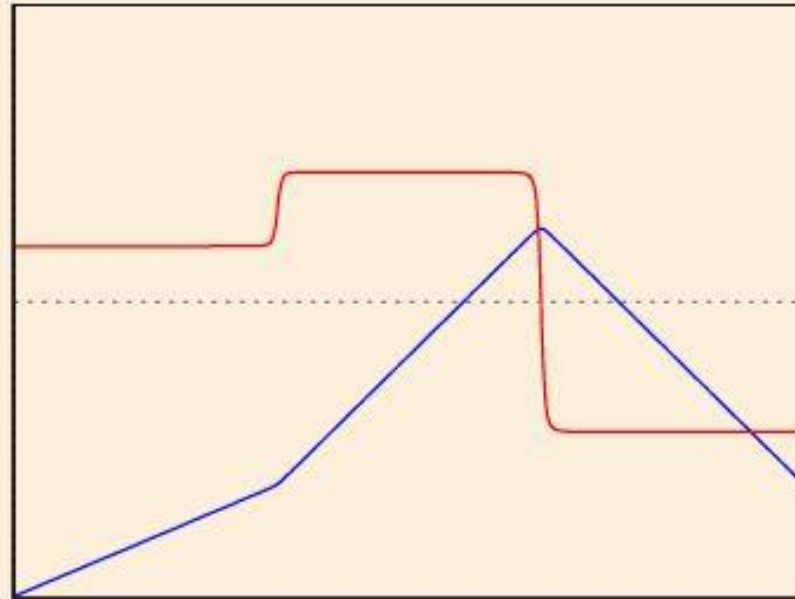Upload a file giving your attempt at differentiation from the graph

Maximum file size: 2MB, maximum number of files: 1

▪ Files

MATH19801 Question from 2020

The plot is as seen below alongside the original function.

When the function increases, the derivative is positive. When the function decreases, the derivative is negative. Steeper increases/decreases are characterised by larger positive/negative values of the derivative.

Exams January 2021

- MATH19801 : Hybrid Exam. 1 hour STACK paper and one hour written (scanned and uploaded) paper during window on same day.

- MATH29681 : Fully electronic exam paper. Subject of EAMS2021 presentation by Dr Igor Chernyavsky
  - Question with a scan
  - Question with text

- Staggerred starts for STACK

Exam Question : January 2021

Enter an even function $f(x)$ that satisfies $f(0) = -5$ and $f(4) = 2$.

$$-3/2-7/2*\cos(pi*x/4)$$

Your last answer was interpreted as follows:

$$\frac{-3}{2} - \frac{7}{2} \cdot \cos\left(\frac{\pi \cdot x}{4}\right)$$

The variables found in your answer were: $[x]$

Check

Exam Question : January 2021

Enter an even function $f(x)$ that satisfies $f(0) = -5$ and $f(4) = 2$.

-3/2-7/2*cos(pi*x/4)

Your last answer was interpreted as follows:

$$\frac{-3}{2} - \frac{7}{2} \cdot \cos\left(\frac{\pi \cdot x}{4}\right)$$

The variables found in your answer were: [x]

Check

Correct answer, well done.

You do indeed have an even function which satisfies the conditions.

Marks for this submission: 1.00/1.00.

There are many even functions satisfying the criteria. One is $f(x) = \frac{7 \cdot x^2}{16} - 5$. $f(-x)$ is also equal to $\frac{7 \cdot x^2}{16} - 5$

Here $f(0) = -5$ as required.

Also $f(4) = -5 + 7 = 2$ as required.

However, there are MANY other functions that satisfy the conditions and you can see the comments on YOUR function.

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A correct answer is $\frac{7 \cdot x^2}{16} - 5$, which can be typed in as follows: (7*x^2)/16-5

EAMS 2022 **Exams by e-assessment : Long-term movement or short-term reaction** **MANCHESTER 1824**

Coursework Spring 2021

- MATH19662 : Two STACK assignments. Best practice and single assessment to count. Most question stems from practice repeated in assessment.

Exams : May/June 2021

- MATH19662 : 1 hour written/scanned paper and 1 hour STACK (randomized) paper on the same day.

Academic Year 2021/22

- September to December : Most students studying in person. Some students in some departments given permission to study remotely. Dual delivery. Affects semester 1 teaching

- January to June : All students study in person. Affects January Exams, semester 2 teaching and June Exams.

Coursework : Autumn 2021

- MATH19801 : Diagnostic Followup continued as normal. Other tests converted to online : STACK.

- MATH29681 : Two pieces of coursework online : STACK.

- Reasonable time-windows : practice available : randomized coefficients.

Exams January 2022

- MATH19801 : Hybrid Exam. 1 hour STACK paper and one hour written (invigilated) paper during window on same day. Written 09:45 to 10:45 and STACK 2 pm to 5 pm.

- MATH29681 : Fully electronic exam paper. Now also invigilated within cluster.

STACK Exam MATH29681

- This year did prove unpopular with students. Marks not particularly low. Some mentioned invigilated conditions. Possibility of invigilated coursework for Autumn 2022.

Coursework Spring 2022

- MATH19662 : Two STACK assignments. Best practice and single assessment to count. Most question stems from practice repeated in assessment.

- Very routine now.

Exams : May/June 2022

- MATH19662 : Two hour hybrid paper. Invigilated in computer cluster. Written paper designed to last one hour. STACK paper designed to last one hour.

Some other exams

- Maths 2M1 : MATH29661 : Semester 1 : 2nd year MACE

- Coursework traditionally STACK

- Exam January 2021. 1 hour STACK Exam and 1 hour take-home scanned exam. A few cases of malpractice.

- Exam January 2022. 1 hour STACK Exam and 1 hour take-home scanned exam. A few cases of malpractice.

- Likely to revert to traditional form for January 2023

Some other exams

- Algebraic Structures 1 : MATH20201 : Semester 1 : 2nd year maths

- Exam January 2020. Traditional written exam including bookwork and stating definitions / theorems

- Exam January 2021. 1 hour multiple choice Exam and 1 hour take-home scanned exam. Reasoning skills rather than recall. A few cases of malpractice.

- Exam January 2022. 1 hour multiple choice Exam and 1 hour take-home scanned exam. Reasoning skills rather than recall.

- Form not decided for January 2023

Some other exams

- Maths 1G1 : MATH19731 : Semester 1 : 1st year Materials

- Exam January 2021. 1 hour multiple-choice Exam and 1 hour take-home scanned exam.

- Exam January 2022. 1 hour multiple-choice Exam and 1 hour take-home scanned exam.

- Likely to stay this way for January 2023

Some other exams

- Differentiable Manifolds : MATH40161 : Semester 1 : 4th year maths

- Exam January 2021. Take-home and scanned uninvigilated exam

- Exam January 2022. Take-home and scanned uninvigilated exam

- Possible to stay this way for January 2023

Reasons to move BACK to traditional assessment

- Knock on issues from malpractice on uninvigilated take-home written exams

- Concerns over partial credit e.g. in multiple choice questions or in the difficulty of trapping ALL sensible nodes in a STACK prt tree.

- Ability to ask about bookwork or statements of theorems.

- Some colleagues find it easier to work on paper than on screen.

Conclusions

- Many different modes used of late
- Some courses will continue to use such modes.
- Others will return to more traditional forms.
- Thanks to
  - Dr Robert Gaunt
  - Dr Christopher Johnson
  - Dr Marianne Johnson
  - Dr Theodore Voronov