

Numbas e-assessment in Covid times

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Xrun



NUMBAS

This talk

About Numbas

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How we've used Numbas during remote teaching

About Numbas

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Randomisation

Practise similar questions over and over again.

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A quick look at a Numbas test:

[Demo test >](#)

Units example

Loading...

Created using Numbas (<https://www.numbas.org.uk>), developed by Newcastle University (<http://www.newcastle.ac.uk>).

Remote learning trends

A few trends from the past year:

- More diverse and extensive formative assessment
- Dramatic increase in use in engineering
- Remote 'labs' using Numbas
- Hybrid tests
- Final exams

Formative assessment

We've seen more formative use; more appreciation of the "weekly quiz".

The screenshot shows a Blackboard LMS interface. On the left is a navigation sidebar with icons for Account, Dashboard, Courses, Calendar, Inbox, History, and Help. The main content area is titled "MAS2803-MAS2805-PHY2033 (20/21) > Modules > Semester 1 > Week 4 Handout". The page content is titled "Root finding functions" and includes the following text:

There are functions in Python which can do the hard work for us.

Using NumPy's `roots` to find the roots of polynomial.

The function `roots` will find roots of a **polynomial**, given its coefficients.

For example $f(x) = x^3 + x^2 + x - 3$

```
import numpy as np
p = [1,1,1,-3]
r = np.roots(p)
print(r)
```

You'll see that it returns both real and complex roots.

Note that for missing terms you just insert a zero, e.g. $x^2 - 2$:

```
p = [1,0,-2]
r = np.roots(p)
print(r)
```

Though the function really does make this straightforward, you should always check that the output is correct, for example by making a plot.

Exercise 4.3

Hide exercise >

Use NumPy's `roots` to find the solution of $x^2 - x - 1 = 0$

The roots are and

Show steps (Your score will not be affected.)

Gap 0
✔ Your answer is correct. You were awarded 1 mark.

Gap 1
✔ Your answer is correct. You were awarded 1 mark.

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More diverse applications to ask questions involving Python, R, MATLAB, SPSS, Minitab.

The screenshot displays a Blackboard LMS interface. On the left is a vertical navigation menu with icons for Account, Dashboard, Courses, Calendar, Inbox, History, and Help. The main content area shows a breadcrumb trail: MAS2803-MAS2805-PHY2033 (20/21) > Modules > Semester 1 > Week 4 Handout. The page title is "Root finding functions". Below the title, there is introductory text: "There are functions in Python which can do the hard work for us. Using NumPy's `roots` to find the roots of polynomial. The function `roots` will find roots of a polynomial, given its coefficients. For example $f(x) = x^3 + x^2 + x - 3$ ". A code block shows:

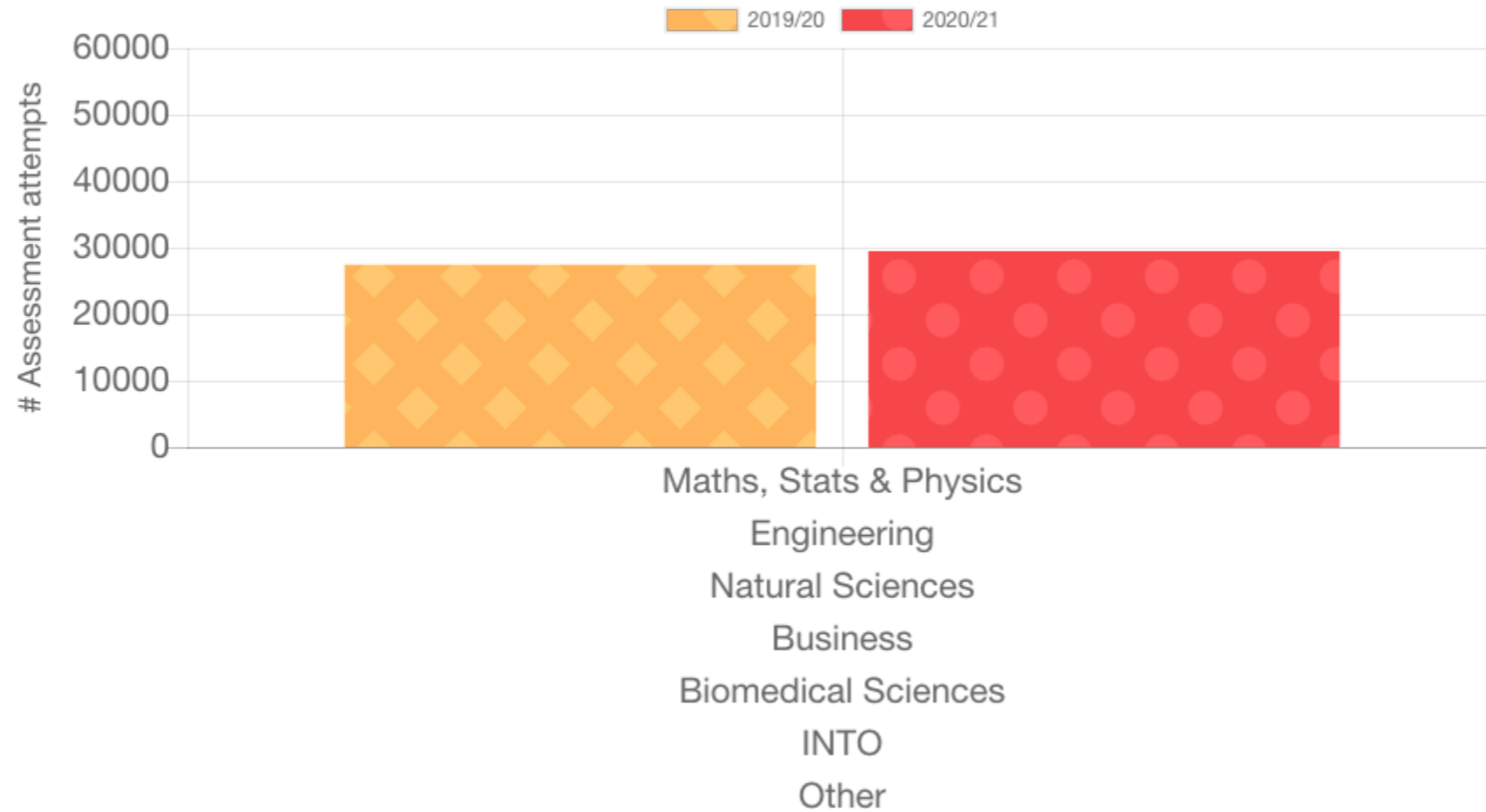
```
import numpy as np
p = [1,1,1,-3]
r = np.roots(p)
print(r)
```

 Below the code, it says "You'll see that it returns both real and complex roots. Note that for missing terms you just insert a zero, e.g. $x^2 - 2$ ". Another code block shows:

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p = [1,0,-2]
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print(r)
```

 Below this, it says "Though the function really does make this straightforward, you should always check that the output is correct, for example by making a plot." The "Exercise 4.3" section has a "Hide exercise >" button. The question text is "Use NumPy's `roots` to find the solution of $x^2 - x - 1 = 0$ ". The user's answer is "The roots are and ". There is a "Show steps" button with the note "(Your score will not be affected.)". The feedback shows two "Gap" items, both marked as correct with a green checkmark: "Gap 0 Your answer is correct. You were awarded 1 mark." and "Gap 1 Your answer is correct. You were awarded 1 mark."

Engineering uptake



Remote Labs

NUMBAS

Gears Lab

Question 1 Score: 0/2
Unanswered

Question 2 Score: 0/7
Unanswered

Question 3 Score: 0/29
Unanswered

Total 0/38

Pause

End Exam

Now wrap the string around the pulley on the 100 tooth gear and hang a weight carrier onto it.
Add masses to the value of 0.30kg (remember to include the mass of the carrier).

Single Reduction Part 2

Calculate the Applied Force (A, to three decimal places). Applied force = $mg = \text{ ___ N}$ ($g=9.81\text{m/s}^2$).

Calculate the Torque T_o applied to the gear (B, to four decimal places).

Calculate the theoretical torque T_i at the 20 tooth gear required to lift this weight, neglecting any effects of friction (C, to four decimal places).

Enter your answers into the table below before continuing (but do not submit answers yet!).

In the same way, suspend a second weight carrier from the pulley on the 20 tooth gear. Add masses until this second carrier just falls smoothly, taking about 3s to fall the full height of about 100mm. Insert this mass to the table below under D, and use it to calculate the applied force (to three decimal places) under E.

Calculate the torque T_i applied to this gear (F, to four decimal places).

Calculate the actual torque ratio - T_o/T_i - (G, to two decimal places).

Finally, calculate the efficiency as a percentage (H, to one decimal place).

Pulley diameter: 40mm.

Mass on Output Pulley (kg)	A: Applied Force (N)	B: Applied Torque T_o (Nm)	C: Theoretical Torque T_i (Nm)	D: Mass on Input Pulley (kg)	E: Applied Force (N)	F: Actual Torque T_i (Nm)	G: Actual Torque Ratio	H: Efficiency (%)
0.30	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Submit answer

Score: 0/7

Try another question like this one

Reveal answers

Stripped-down example

Hybrid assessments

Used for in-course assessment and final exams

Typically 60-80% auto-marked. Focus manual marking where it is needed.

Question 1	10 marks Unanswered
Question 2	6 marks Unanswered
Question 3	16 marks Unanswered
Question 4	20 marks Partially answered
Question 5	23 marks Unanswered
Question 6	10 marks Unanswered
Question 7	15 marks Unanswered
Time remaining:	3:57:04

Implement the method in Python to fill `dfdx` with values for the gradient in the remaining elements

```
1 - for i in range(1, len(x)-1):  
2   dfdx[i] = (f[i+1]-f[i-1])/(x[i+1]-x[i-1])  
3
```

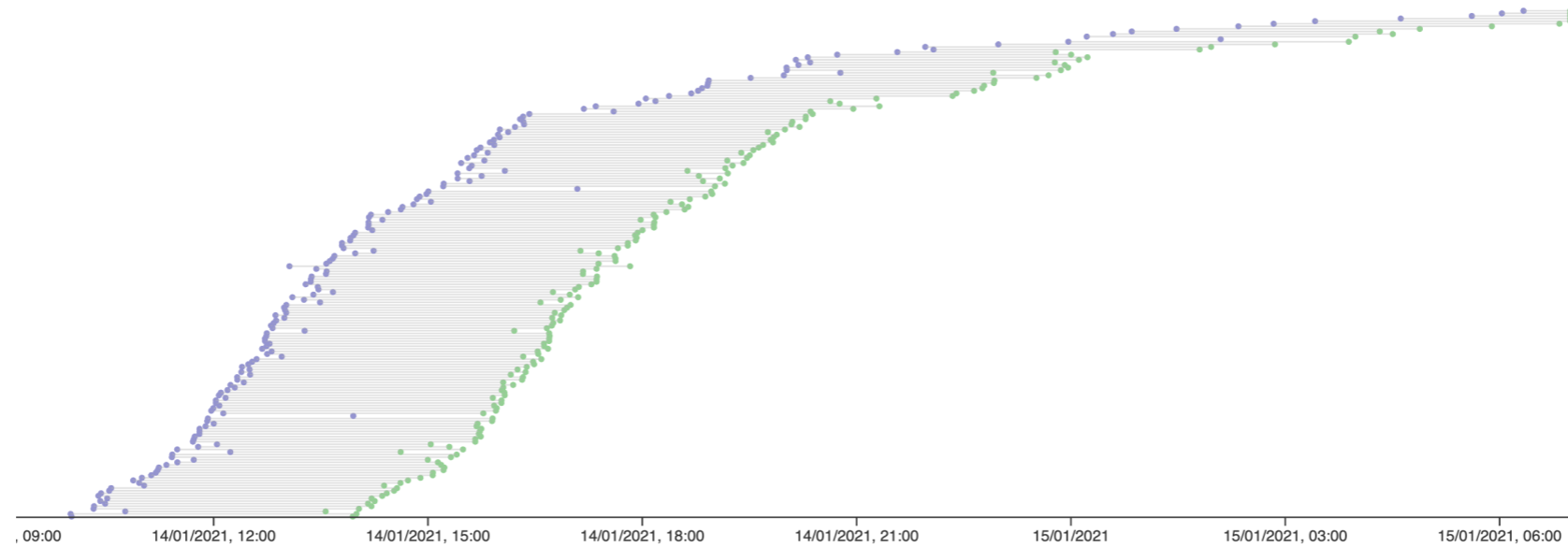
7 marks
Answered

e)
Make a plot of $\frac{df}{dx}$ versus x in the range specified in a)

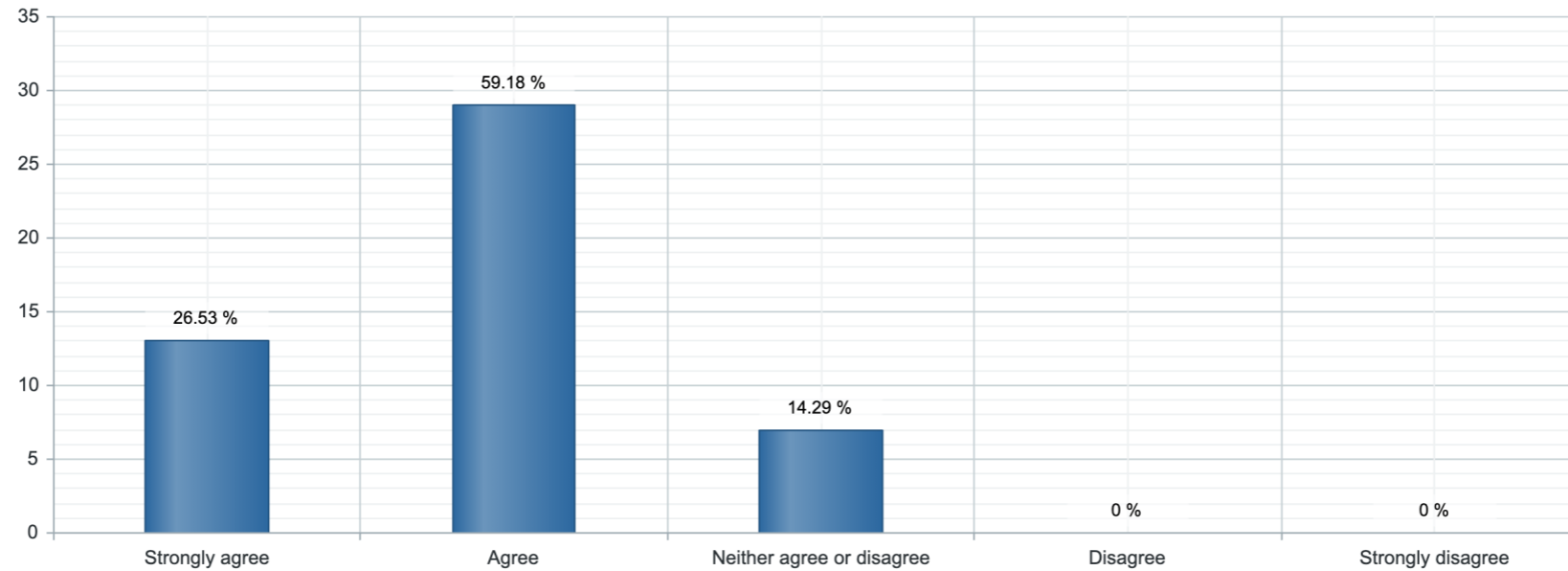
I have written an answer to submit through Canvas

Final exams

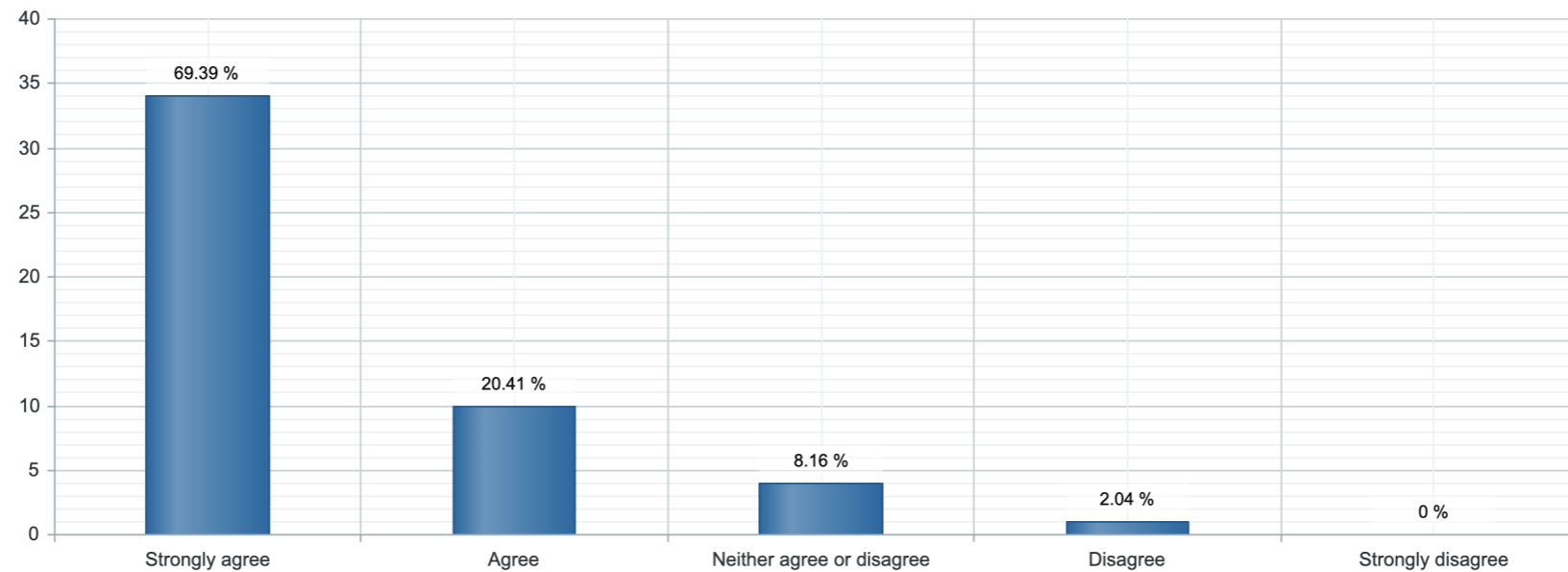
"4 in 24" hybrid format used across all of our stage 1 modules.



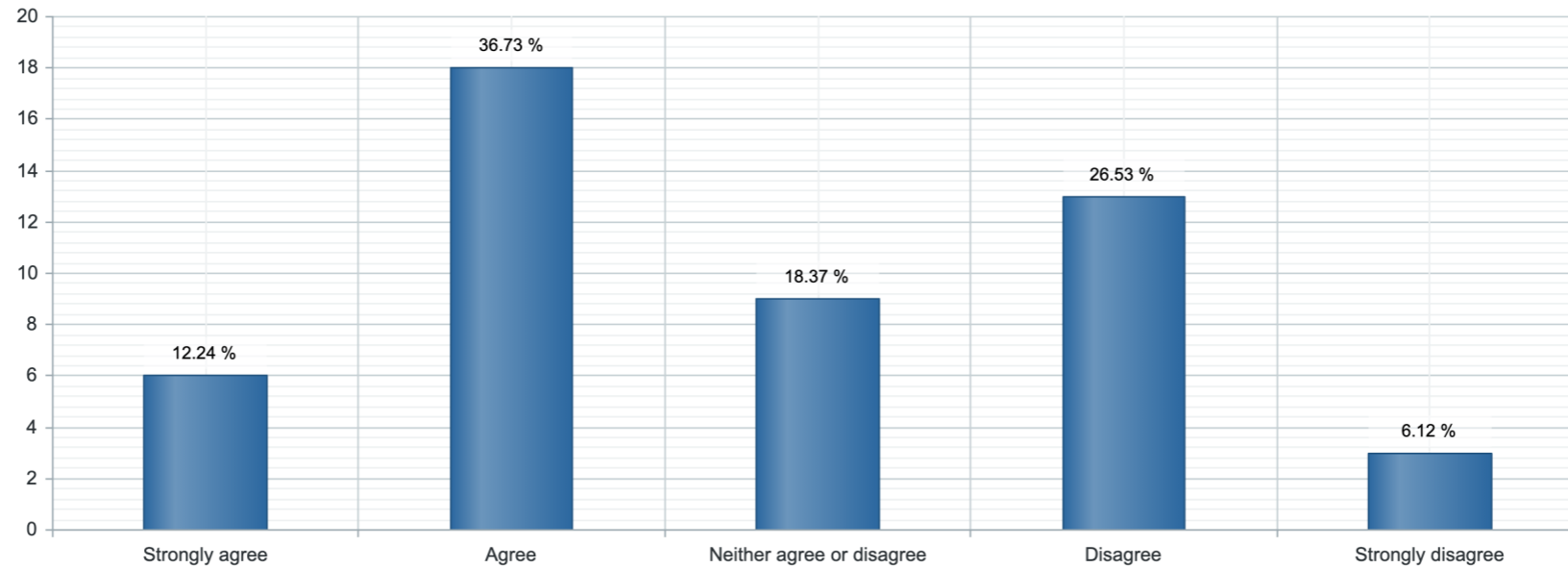
The format of the assessment(s) was easy to understand



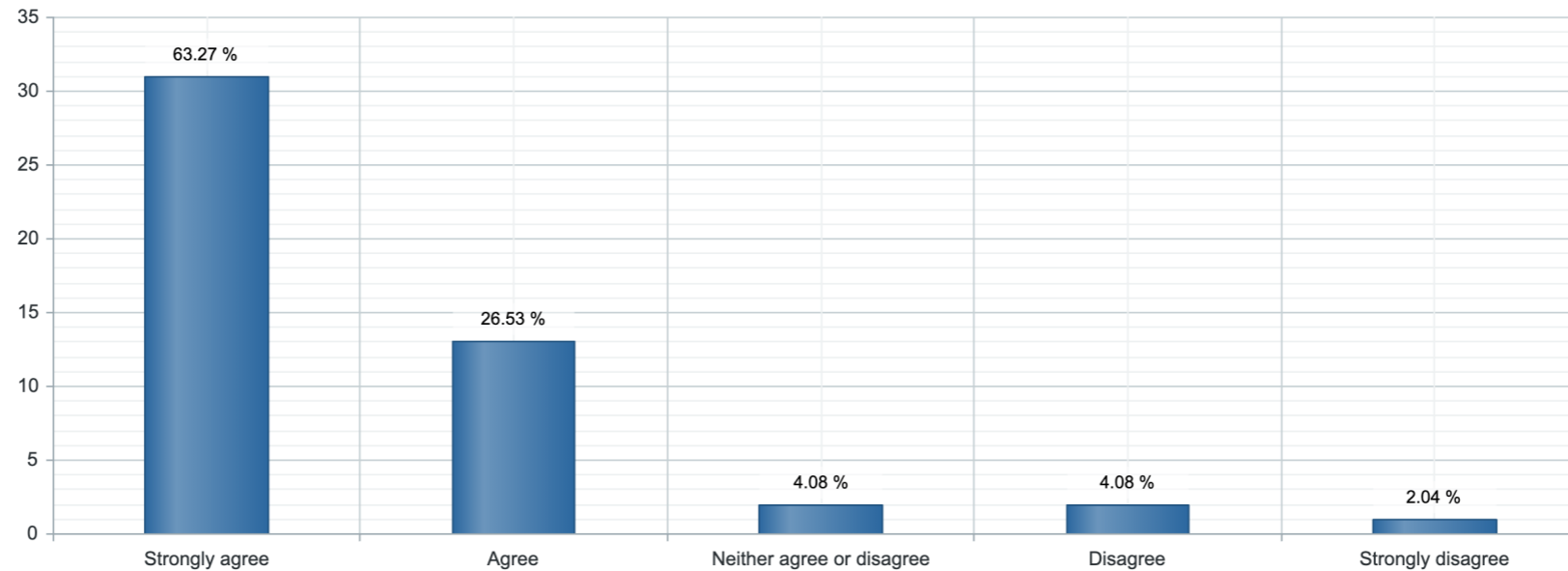
The flexibility of starting at any point in the 24 hours was useful to me



I had enough time to complete the assessment questions



I worked continuously on the assessment(s) during my timed period



Feedback

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- The flexibility of beginning time is so useful especially when many students have jobs etc
- being able to start whenever you want within the 24hrs gives much more flexibility and allows you to better plan out revision.

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- 4 hours was plenty time to Google and try figuring it out with friends

Using Numbas

Mathcentre public Numbas Editor at numbas.mathcentre.ac.uk

Open source LTI tool at numbas-lti-provider.readthedocs.io

Public Numbas Editor

Open to everyone.

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Or write your own.

Thanks for listening

Contact me at christopher.graham@newcastle.ac.uk

Useful links:

- Numbas Website numbas.org.uk
- Numbas Editor numbas.mathcentre.ac.uk