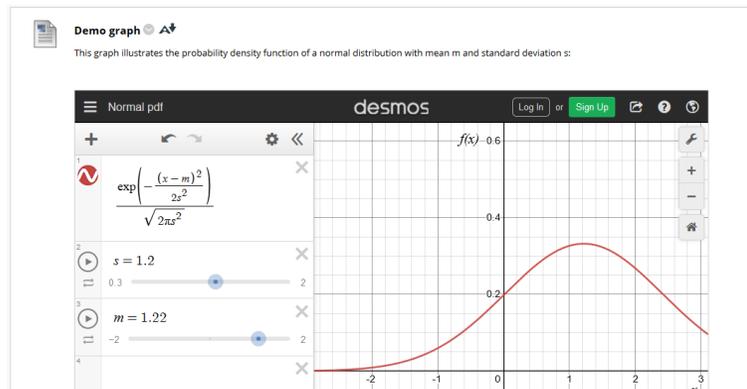


Embedding interactive tools in Blackboard

NF Morrison and Vandita Patel

Department of Mathematics, University of Manchester



Demo Answer Garden

Which topics / questions would you like me to cover in revision?

Type your answer here... Submit

20 characters remaining

binomial trees
format of exam
2020 paper

convexity

black-scholes

2019 q3
stochastic models
how to draw graphs
smooth-pasting

1 like lessogne

Demo - Google sheet

6-immunization

File Edit View Insert Format Data Tools Add-ons Help Last e...

100% \$ % .00 123 Default (Ca... 11 B I A ...

A1	B	C	D	E	F	G	H	I	J
1	NF Morrison								
2	Spreadsheet for immunization calculations (convexity, effective duration etc)								
3	CASE WITH ONE UNKNOWN ASSET (n years, x amount), SOLVE FOR n,x SUCH THAT FUND BALANCED AND CHECK WHETHER								
4									
5		Interest rate:	0.02						
6									
7		Liability amounts:	100000	157500					
8		due at the end of years:	10	14					
9		Contrib to NPV	82034.82999	119365.3164	0	0	0	0	0
10		Contrib to effective duration numerator	804263.0391	1638347.48	0	0	0	0	0
11		Contrib to convexity numerator	8673424.931	24093345.29	0	0	0	0	0
12									
13		KNOWN Asset amounts:	200000						
14		due at the end of years:	15						
15		Contrib to NPV	148602.946		0	0	0	0	0
16		Contrib to effective duration numerator	2185337.441		0	0	0	0	0
17		Contrib to convexity numerator	34279803		0	0	0	0	0

Motivation

- **Interactive** teaching enhancement activities within Blackboard
- **Synchronous** and **asynchronous** use of the same examples
- **Versatility**: many established tools may be embedded, e.g. Desmos, Padlet, Mentimeter, Answer Garden, Voice Thread, Tricider, Google documents.
- **Limitations**: not all tools can be embedded directly (e.g. Jamboard) but a hyperlink + screenshot can be pasted to aid asynchronous use.

Worked Examples

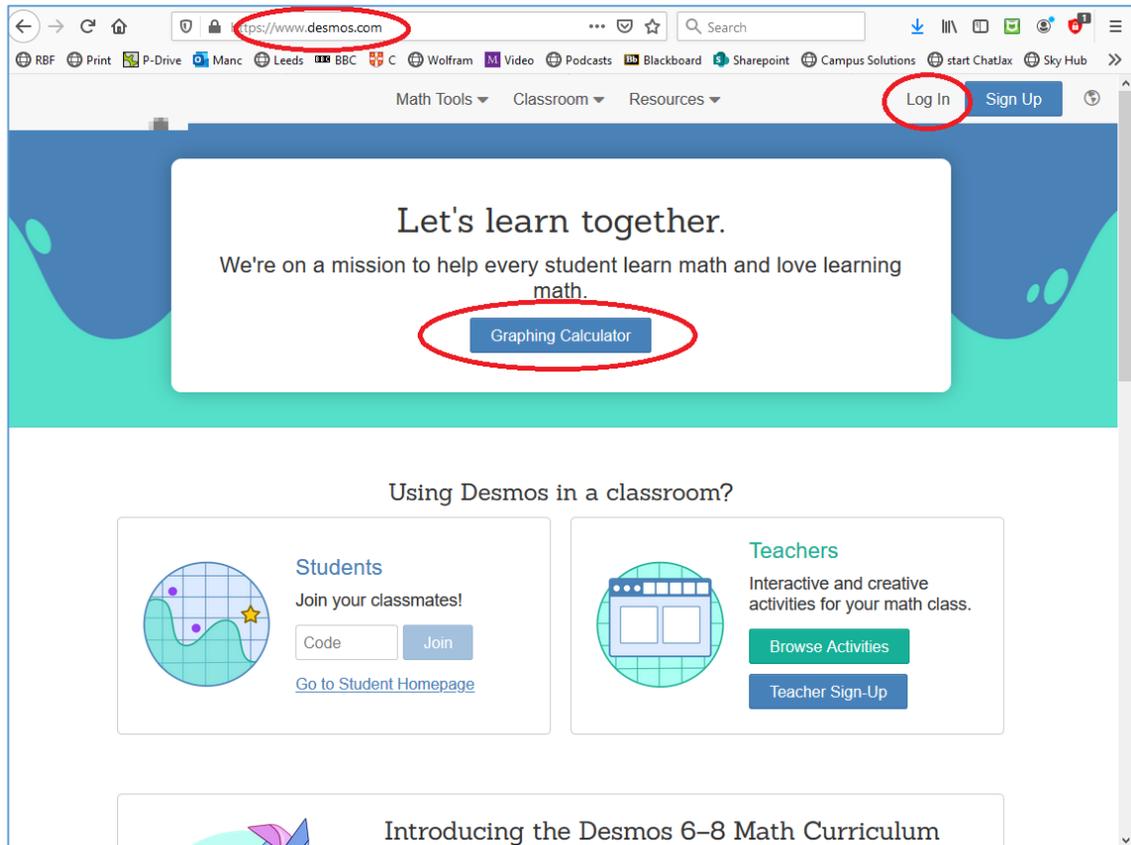
The following slides include **walkthroughs** for three examples:

- 1. Desmos** - Graph with adjustable parameters - visualization aid
- 2. Answer Garden** - Gathering student responses & feedback
- 3. Google Document** - Spreadsheet calculator - can be adapted to embed any office-style document

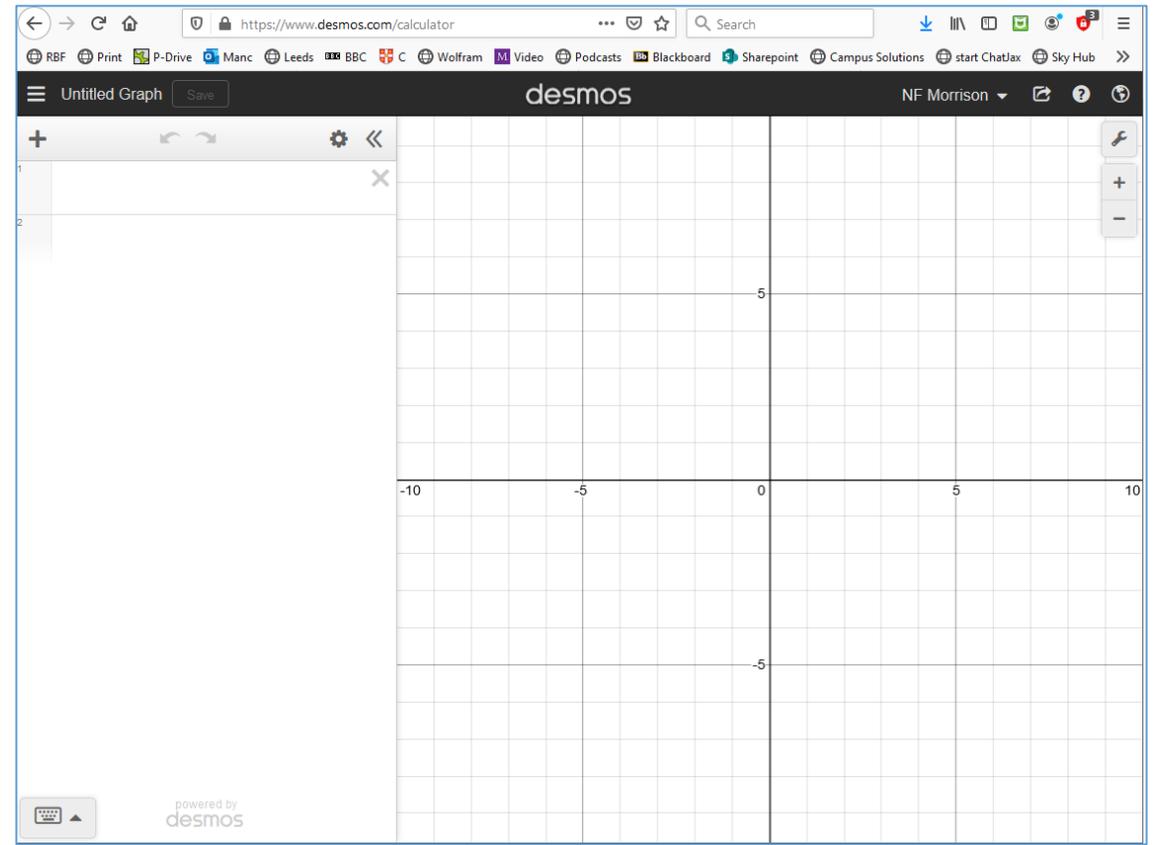
Example – Interactive Graph (slide 1 of 4)

Aim : embed an interactive graph in Blackboard – adjustable parameters to aid students' visualization

1. At www.desmos.com – log in and click “graphing calculator”

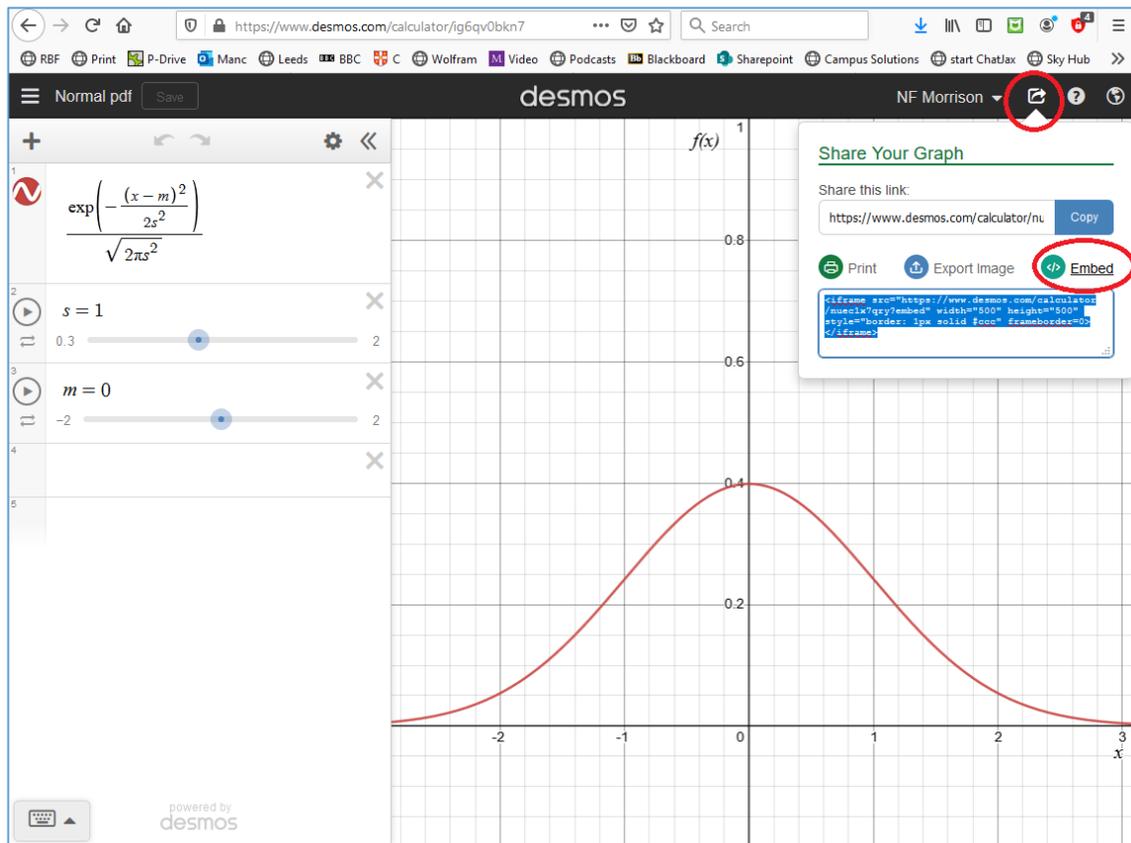


2. Create graph



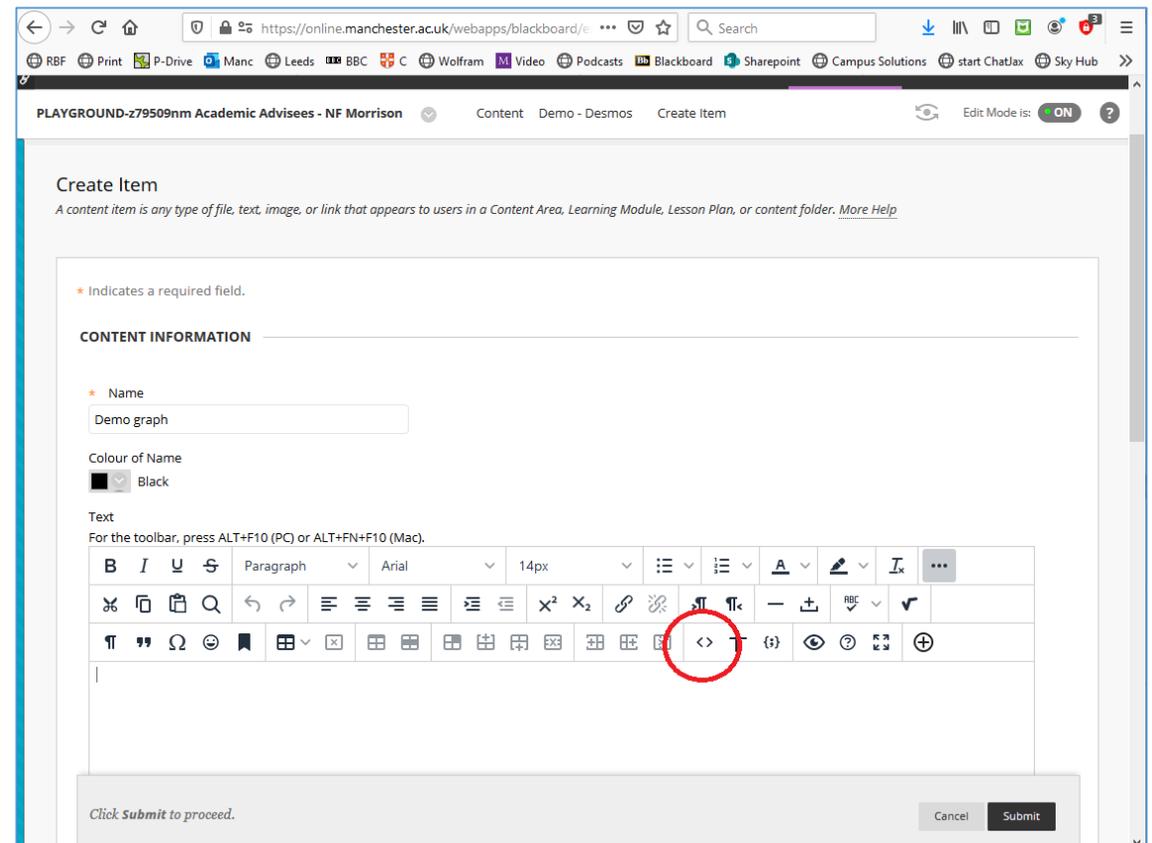
Example – Interactive Graph (slide 2 of 4)

3. Copy “Embed” code



The screenshot shows the Desmos calculator interface. The main graph displays a red curve representing the function $f(x) = \frac{\exp\left(-\frac{(x-m)^2}{2s^2}\right)}{\sqrt{2\pi s^2}}$. The graph has two sliders: $s = 1$ (ranging from 0.3 to 2) and $m = 0$ (ranging from -2 to 2). The 'Share Your Graph' dialog box is open, showing the URL <https://www.desmos.com/calculator/nu> and the 'Embed' button circled in red. The 'Embed' button is located next to the 'Print' and 'Export Image' buttons. The 'Embed' button is circled in red.

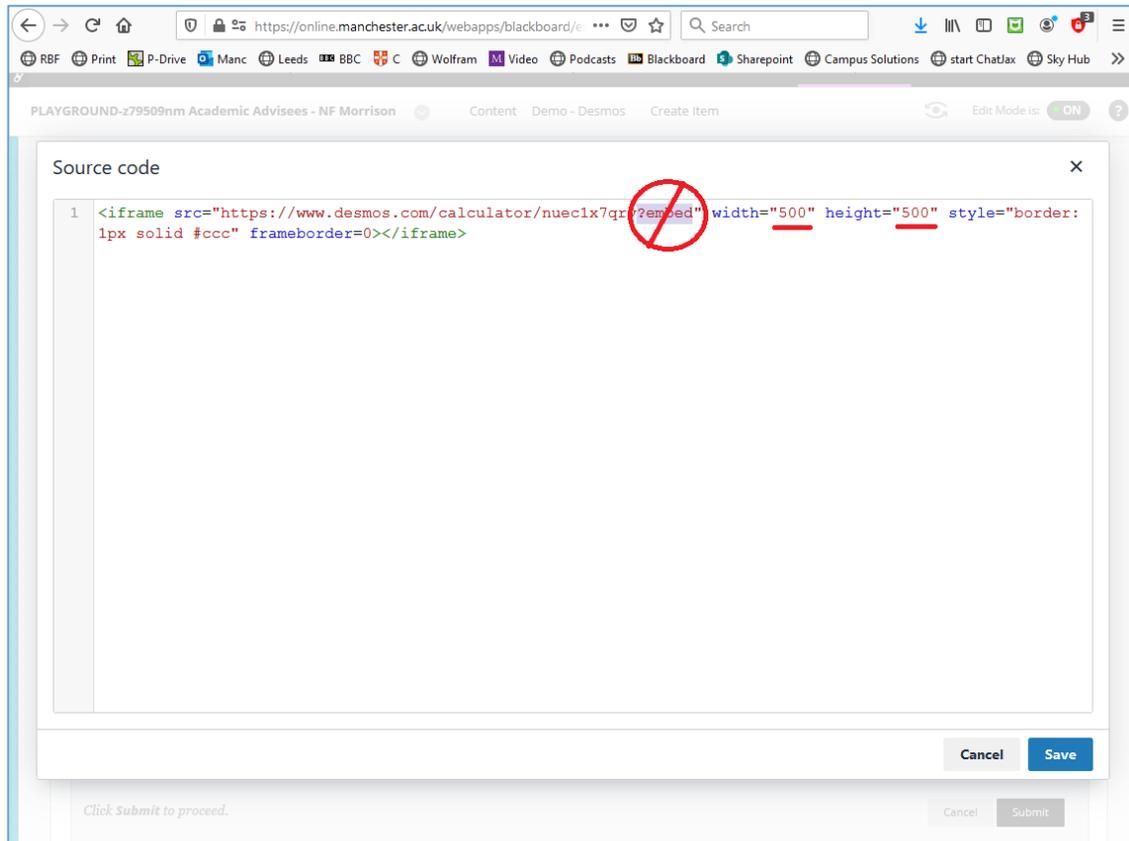
4. Create Item on Blackboard and click the source code icon <>



The screenshot shows the Blackboard 'Create Item' dialog box. The 'CONTENT INFORMATION' section is visible, with the 'Name' field containing 'Demo graph'. The 'Embed' button is circled in red. The 'Embed' button is located in the bottom right corner of the dialog box, next to the 'Cancel' and 'Submit' buttons. The 'Embed' button is circled in red.

Example – Interactive Graph (slide 3 of 4)

5. Paste embed code and delete ?embed from the URL



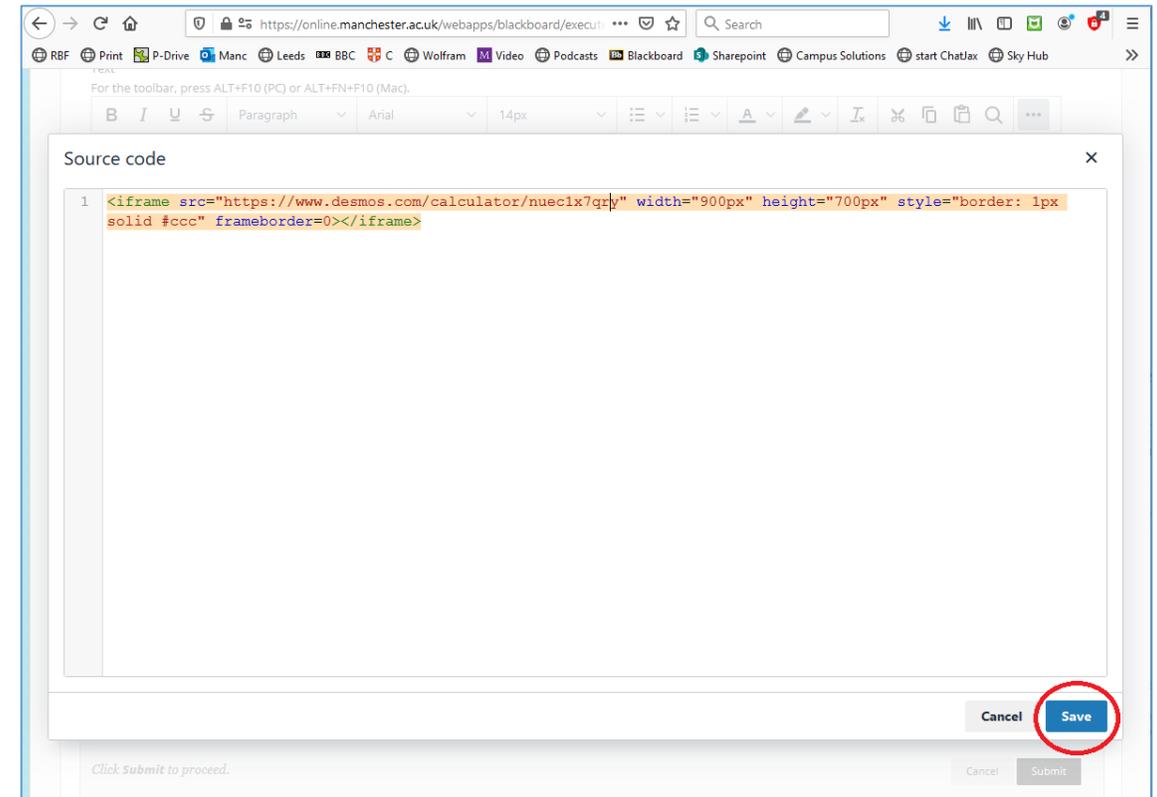
Source code

```
1 <iframe src="https://www.desmos.com/calculator/nuec1x7qr?embed" width="500" height="500" style="border: 1px solid #ccc" frameborder=0></iframe>
```

Cancel Save

Click Submit to proceed.

6. Also adjust the width and height as desired, then click Save



Source code

```
1 <iframe src="https://www.desmos.com/calculator/nuec1x7qrly" width="900px" height="700px" style="border: 1px solid #ccc" frameborder=0></iframe>
```

Cancel Save

Click Submit to proceed.

Example – Interactive Graph (slide 4 of 4)

7. Add some descriptive text as desired and click Submit

This graph illustrates the probability function of a normal distribution with mean m and standard deviation s .

Normal pdf

$$f(x) = \frac{\exp\left(-\frac{(x-m)^2}{2s^2}\right)}{\sqrt{2\pi s^2}}$$

$s = 1$

$m = 0$

Click **Submit** to proceed.

8. Graph is now embedded in Blackboard – students and staff can adjust the parameters & formulae, zoom/axes, within BB

This graph illustrates the probability density function of a normal distribution with mean m and standard deviation s :

Normal pdf

$$f(x) = \frac{\exp\left(-\frac{(x-m)^2}{2s^2}\right)}{\sqrt{2\pi s^2}}$$

$s = 1.383$

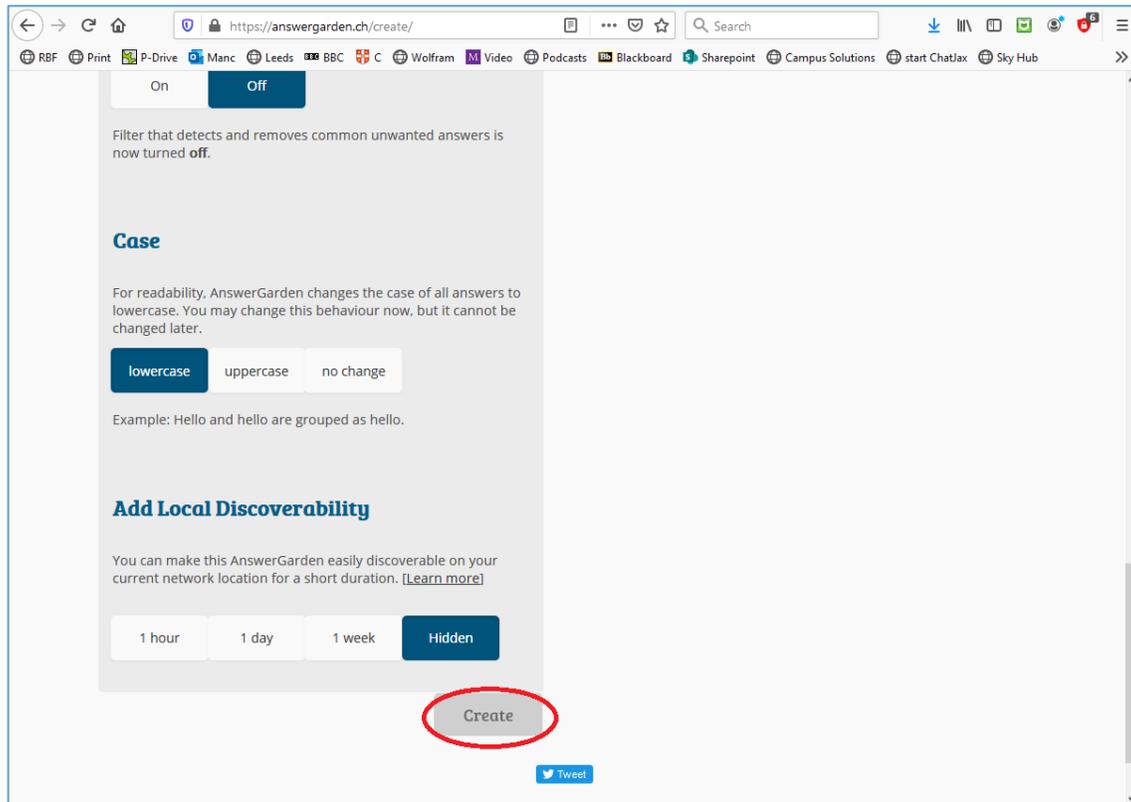
$m = 1.9$

powered by

Play buttons can be used to animate the graph

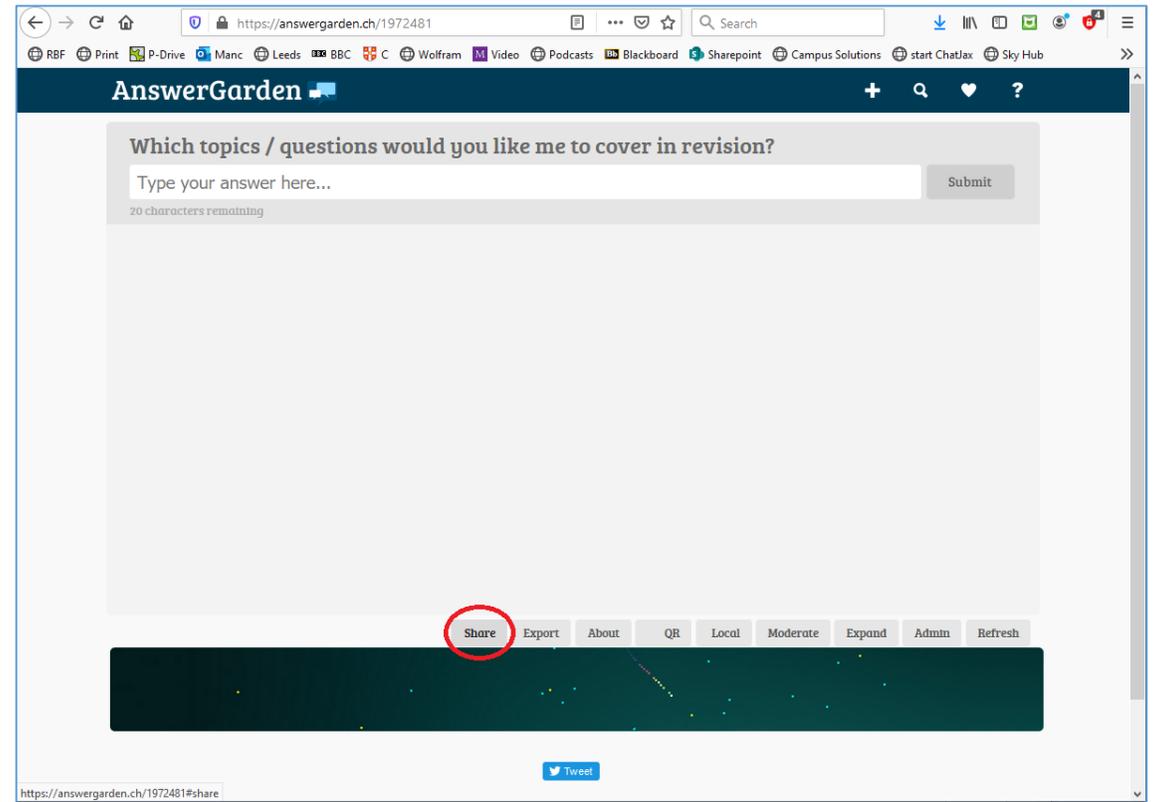
Example – Answer Garden (slide 2 of 4)

3. Adjust settings as desired, then click Create



The screenshot shows the 'create' page of AnswerGarden. At the top, there is a toggle switch for a filter, currently set to 'Off'. Below this, there is a section titled 'Case' with three buttons: 'lowercase' (selected), 'uppercase', and 'no change'. An example text 'Hello and hello are grouped as hello.' is shown below. The 'Add Local Discoverability' section has three buttons: '1 hour', '1 day', and '1 week', with a 'Hidden' button to the right. At the bottom right, a 'Create' button is circled in red. A 'Tweet' button is visible at the very bottom.

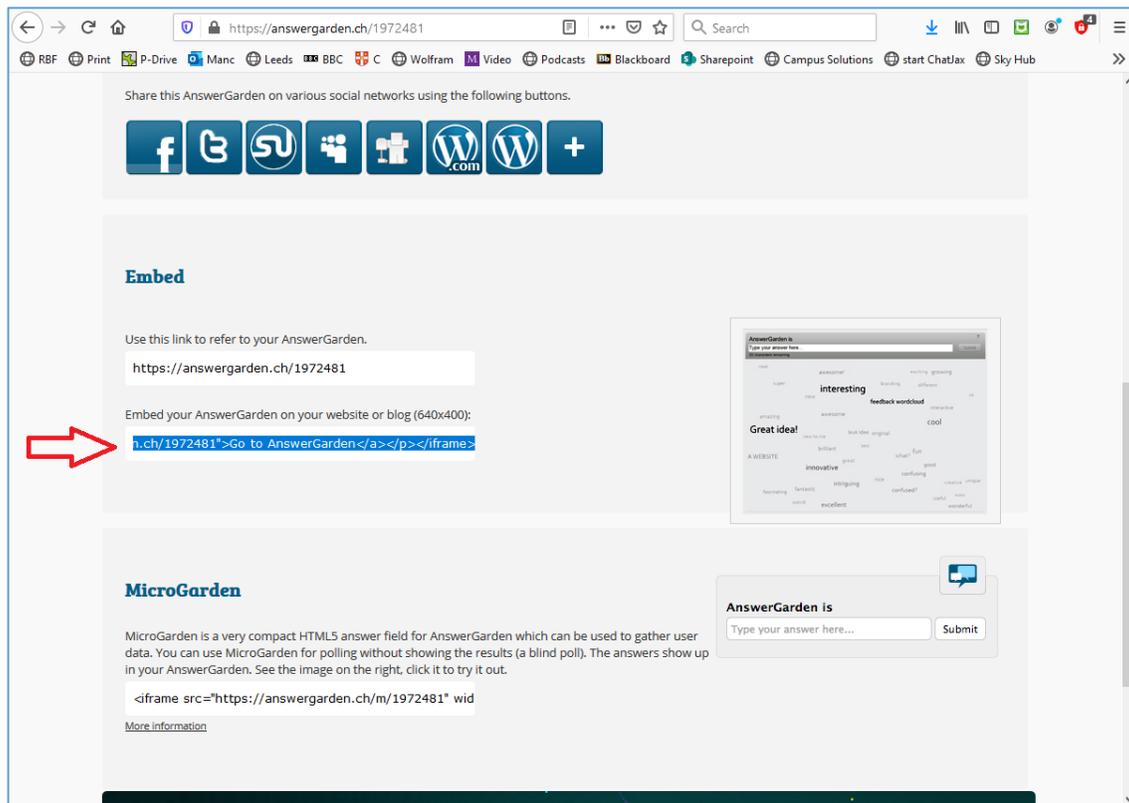
4. Click Share and scroll down



The screenshot shows the 'share' page of AnswerGarden. The page title is 'AnswerGarden'. The main content area contains a question: 'Which topics / questions would you like me to cover in revision?' followed by a text input field with a 'Submit' button and a '20 characters remaining' indicator. At the bottom, a navigation bar contains several buttons: 'Share' (circled in red), 'Export', 'About', 'QR', 'Local', 'Moderate', 'Expand', 'Admin', and 'Refresh'. A 'Tweet' button is visible at the bottom of the page.

Example – Answer Garden (slide 3 of 4)

5. Copy Embed code



Share this AnswerGarden on various social networks using the following buttons.

Embed

Use this link to refer to your AnswerGarden.
<https://answergarden.ch/1972481>

Embed your AnswerGarden on your website or blog (640x400):
`h.ch/1972481>Go to AnswerGarden<p></p></iframe>`

MicroGarden

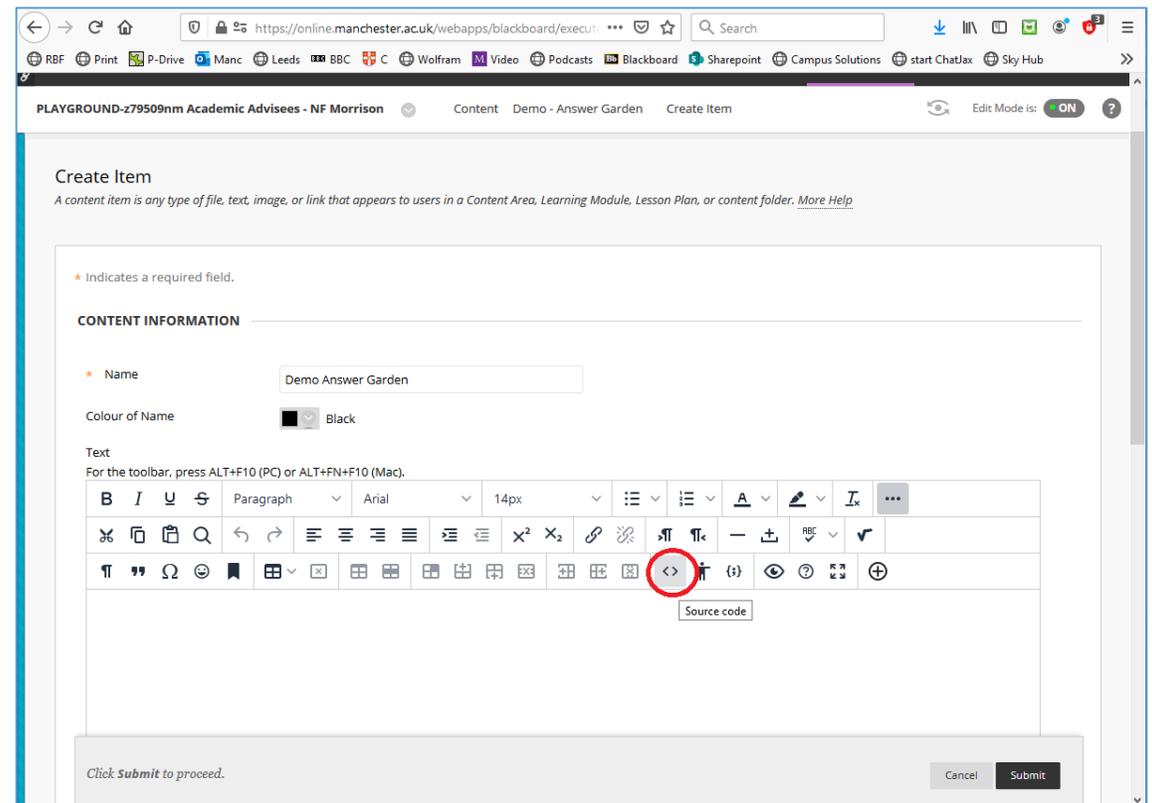
MicroGarden is a very compact HTML5 answer field for AnswerGarden which can be used to gather user data. You can use MicroGarden for polling without showing the results (a blind poll). The answers show up in your AnswerGarden. See the image on the right, click it to try it out.

```
<iframe src="https://answergarden.ch/m/1972481" wid
```

[More information](#)

AnswerGarden is
Type your answer here...

6. Create Item on Blackboard and click the source code icon <>



PLAYGROUND-z79509nm Academic Advisees - NF Morrison

Content Demo - Answer Garden Create Item

Edit Mode is: ON

Create Item

A content item is any type of file, text, image, or link that appears to users in a Content Area, Learning Module, Lesson Plan, or content folder. [More Help](#)

* Indicates a required field.

CONTENT INFORMATION

* Name

Colour of Name

Text

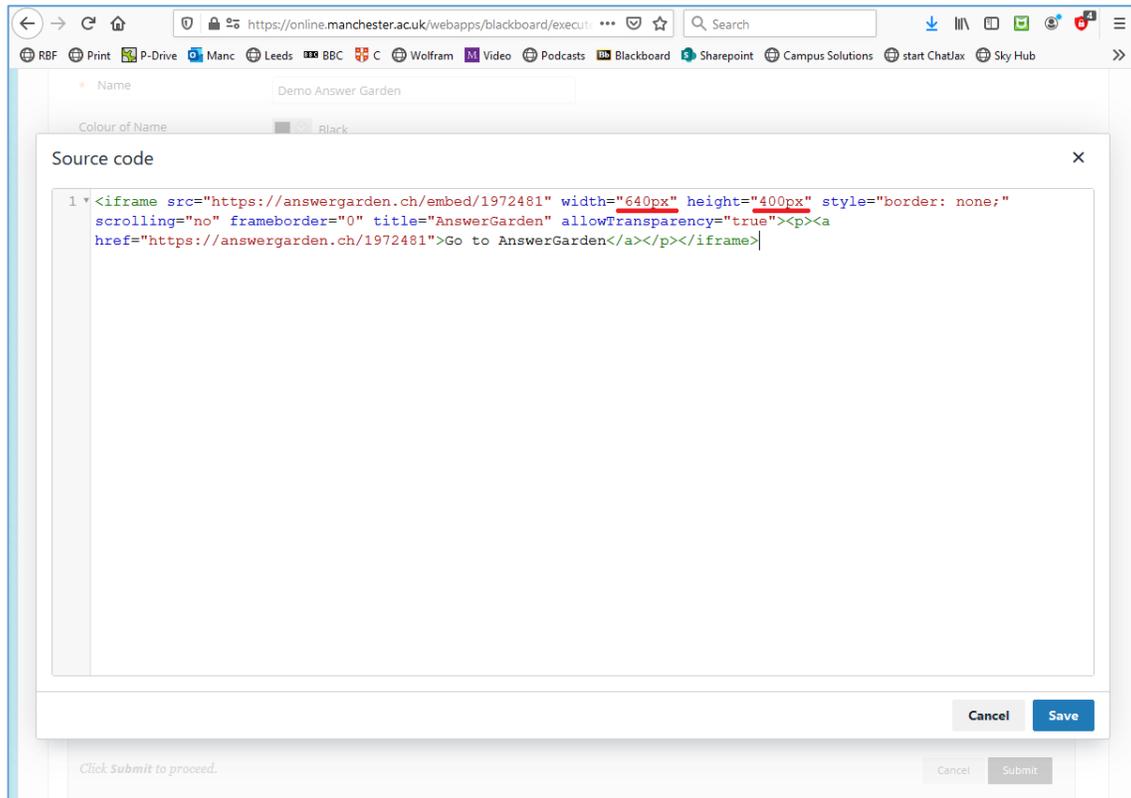
For the toolbar, press ALT+F10 (PC) or ALT+FN+F10 (Mac).

Source code icon <>

Click **Submit** to proceed.

Example – Answer Garden (slide 4 of 4)

7. Paste Embed code, modify width/height, then Save & Submit

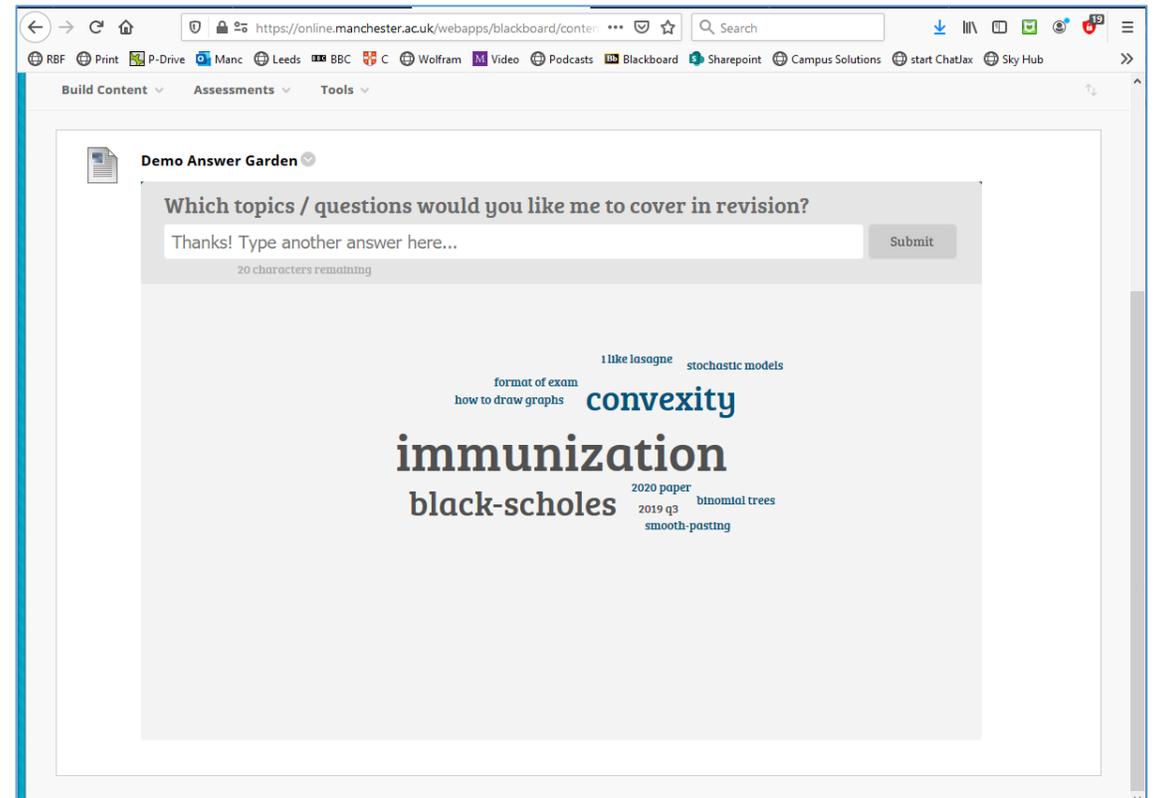


The screenshot shows a web browser window with the URL <https://online.manchester.ac.uk/webapps/blackboard/execute>. The page title is "Demo Answer Garden". Below the title, there is a "Colour of Name" dropdown menu set to "Black". A "Source code" editor is open, displaying the following HTML code:

```
1 <iframe src="https://answergarden.ch/embed/1972481" width="640px" height="400px" style="border: none;"
scrolling="no" frameborder="0" title="AnswerGarden" allowTransparency="true"><p><a
href="https://answergarden.ch/1972481">Go to AnswerGarden</a></p></iframe>
```

At the bottom of the editor, there are "Cancel" and "Save" buttons. Below the editor, there is a "Click Submit to proceed." message and another "Cancel" and "Submit" button.

8. Answer Garden is now embedded in Blackboard – can be used synchronously and asynchronously



The screenshot shows the same Blackboard interface as in slide 7, but now the Answer Garden widget is embedded. The widget title is "Demo Answer Garden". Below the title, there is a question: "Which topics / questions would you like me to cover in revision?". Below the question, there is a text input field with the placeholder text "Thanks! Type another answer here..." and a "Submit" button. Below the input field, there is a character count: "20 characters remaining". Below the input field, there is a word cloud with the following words: "convexity", "immunization", "black-scholes", "format of exam", "how to draw graphs", "1 like lasagne", "stochastic models", "2020 paper", "2019 q3", "binomial trees", and "smooth-pasting".

Example – Google Spreadsheet (slide 1 of 6)

Aim : embed an interactive Google spreadsheet or document in Blackboard – many possible uses depending on your context

1. Create a Sheet (or Document) on Google

docs.google.com/spreadsheets

The screenshot shows a Google Spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	NF Morrison												
2	Spreadsheet for immunization calculations (convexity, effective duration etc)												
3	CASE WITH ONE UNKNOWN ASSET (n years, x amount), SOLVE FOR n,x SUCH THAT FUND BALANCED AND CHECK WHETHER IMMUNIZED												
4													
5		Interest rate:	0.02										
6													
7		Liability amounts:	100000	157500									
8		due at the end of years:	10	21									
9		Contrib to NPV	82034.82999	103914.6911	0	0	0	0					
10		Contrib to effective duration numerator	804263.0391	2139420.112	0	0	0	0					
11		Contrib to convexity numerator	8673424.931	46144355.35	0	0	0	0					
12													
13		KNOWN Asset amounts:	200000										
14		due at the end of years:	15										
15		Contrib to NPV	148602.946	0	0	0	0	0					
16		Contrib to effective duration numerator	2185337.441	0	0	0	0	0					
17		Contrib to convexity numerator	34279803	0	0	0	0	0					
18													
19		Net present value W_L	185949.5211										
20		Net present value	148602.946	(known assets only)									
21													
22		Effective duration V_L	15.83054978										
23		Effective duration	14.70588235	(known assets only)									
24													

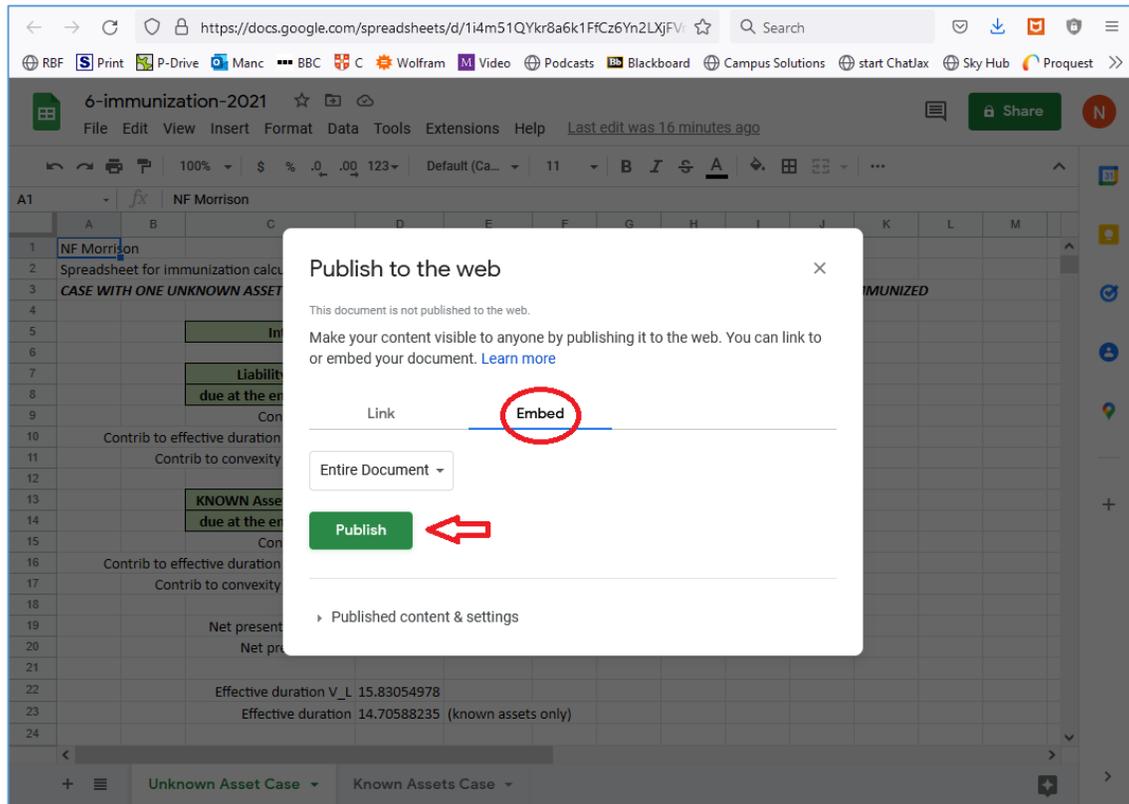
(alternatively create via Excel first, then upload to Google)

2. Click File > Share > Publish to the web

The screenshot shows the same Google Spreadsheet as above, but with the 'File' menu open and the 'Share' > 'Publish to the web' path selected. The 'Publish to the web' dialog is visible, showing the spreadsheet's name and a 'Publish' button.

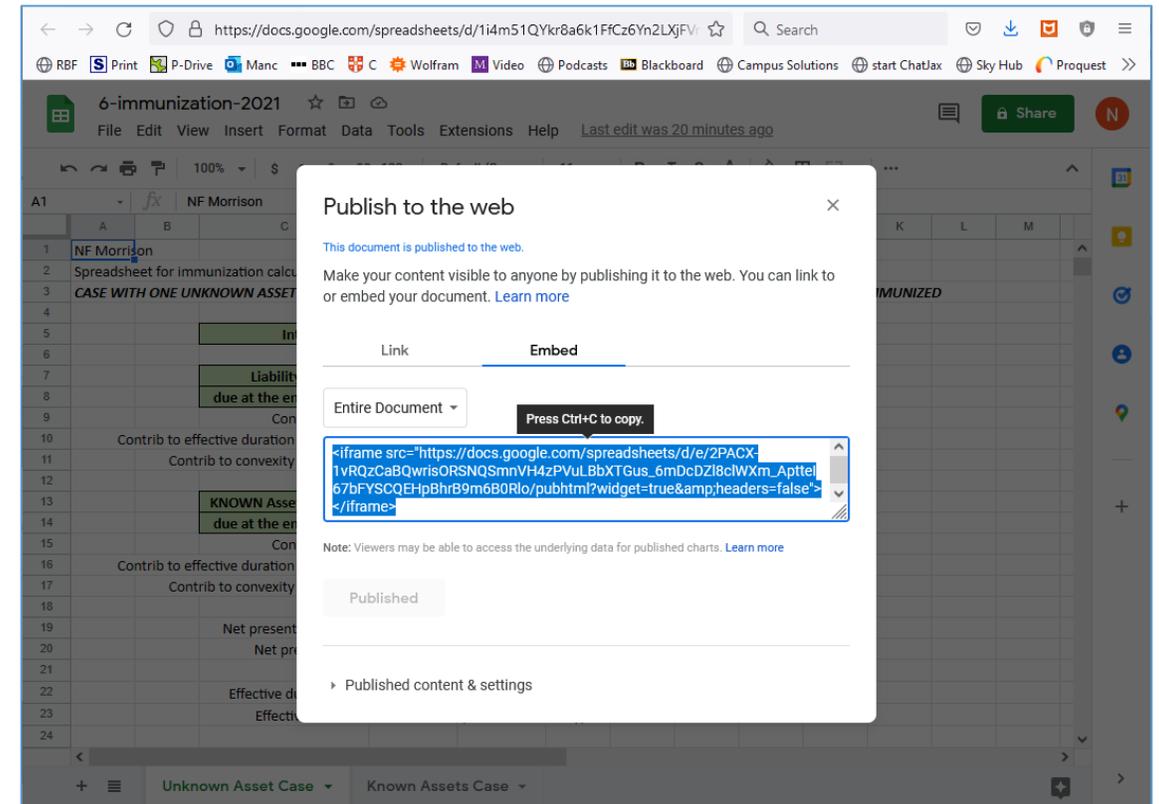
Example – Google Spreadsheet (slide 2 of 6)

3. Click “Embed” then “Publish”



The screenshot shows the 'Publish to the web' dialog box in a Google Spreadsheet. The dialog has two tabs: 'Link' and 'Embed'. The 'Embed' tab is selected and circled in red. Below the tabs, there is a dropdown menu set to 'Entire Document'. A red arrow points to the 'Publish' button. The background spreadsheet shows a table with columns A-M and rows 1-24, containing financial data related to immunization.

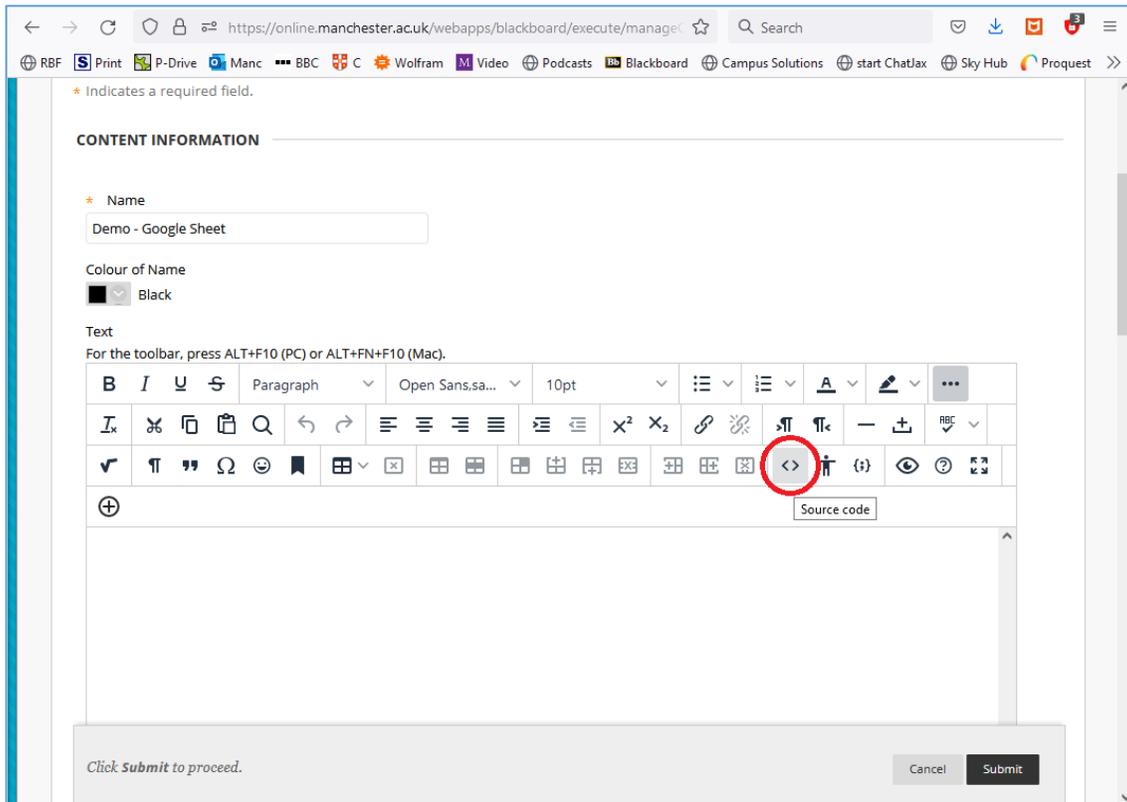
4. Copy the Embed code – we will paste & edit this in Blackboard



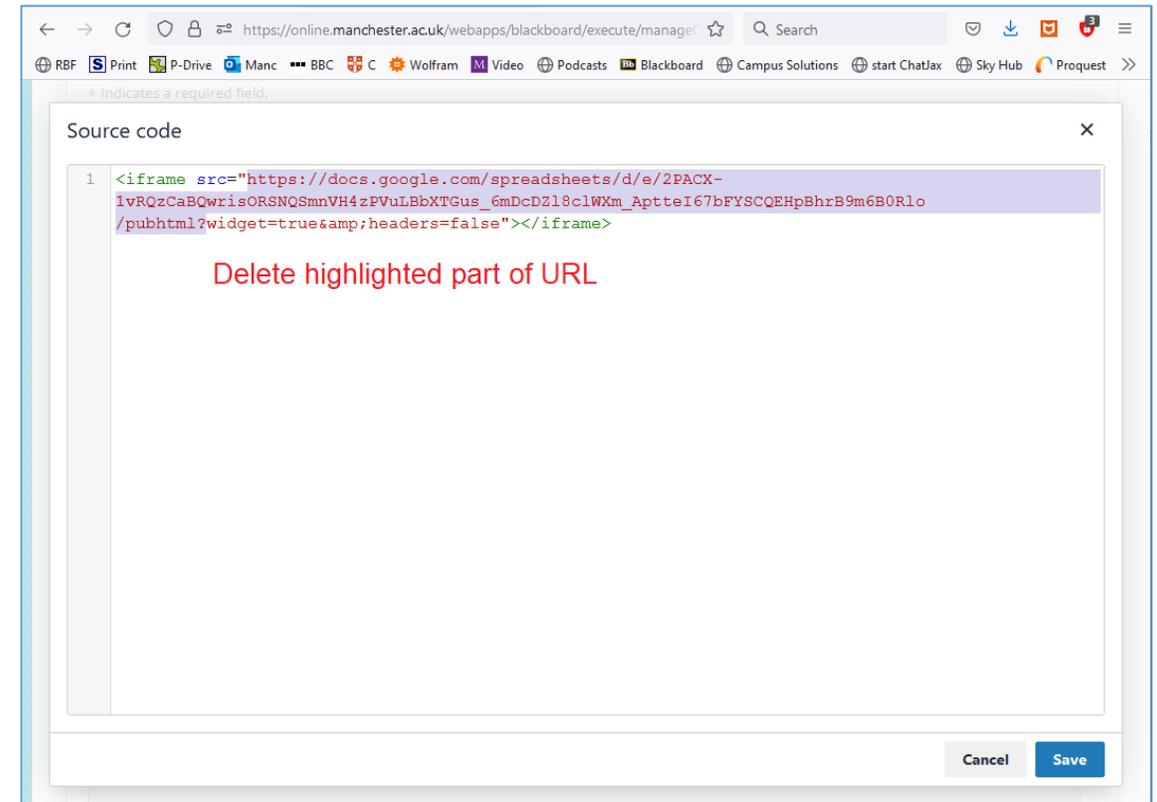
The screenshot shows the 'Publish to the web' dialog box with the 'Embed' tab selected. The 'Entire Document' dropdown is visible. A black box with white text says 'Press Ctrl+C to copy.' Below it, the embed code is displayed in a blue box: `<iframe src="https://docs.google.com/spreadsheets/d/e/2PACX1vRQzCaBQwrisORSNQSmnVH4zPVuL BbXTGus_6mDcdZl8cIWxm_Apttel67bFYSCQEhpBhrB9m6B0Rlo/pubhtml?widget=true&headers=false"></iframe>`. A 'Published' button is visible at the bottom of the dialog. The background spreadsheet is the same as in the previous image.

Example – Google Spreadsheet (slide 3 of 6)

5. Create Item on Blackboard and click the source code icon <>



6. Paste embed code and delete URL up to the word “widget”



Note: if embedding a Google Document instead of a Spreadsheet, delete the URL up to the word “embedded”

Example – Google Spreadsheet (slide 4 of 6)

7. Back on the spreadsheet, click “Share”

The screenshot shows a Google Spreadsheet interface. The 'Share' button in the top right corner is circled in red. The spreadsheet content includes a title '6-immunization-2021', a menu bar, and a grid of data. The data includes interest rates, liability amounts, known asset amounts, and various NPV and duration calculations.

Interest rate:	0.02					
Liability amounts:	100000	157500				
due at the end of years:	10	21				
Contribution to NPV	82034.82999	103914.6911	0	0	0	0
Contribution to effective duration numerator	804263.0391	2139420.112	0	0	0	0
Contribution to convexity numerator	8673424.931	46144355.35	0	0	0	0
KNOWN Asset amounts:	200000					
due at the end of years:	15					
Contribution to NPV	148602.946	0	0	0	0	0
Contribution to effective duration numerator	2185337.441	0	0	0	0	0
Contribution to convexity numerator	34279803	0	0	0	0	0
Net present value W_L	185949.5211					
Net present value	148602.946 (known assets only)					
Effective duration V_L	15.83054978					
Effective duration	14.70588235 (known assets only)					

8. Click “change to anyone with the link”

The screenshot shows the same Google Spreadsheet interface, but with the 'Share with people and groups' dialog box open. The dialog box has two main sections: 'Share with people and groups' and 'Get link'. In the 'Get link' section, the option 'Change to anyone with the link' is highlighted with a red arrow. The 'Restricted' option is currently selected.

Share with people and groups

Add people and groups

N Morrison (you)
nfm24nfm24@googlemail.com
Owner

Done

Send feedback to Google

Get link

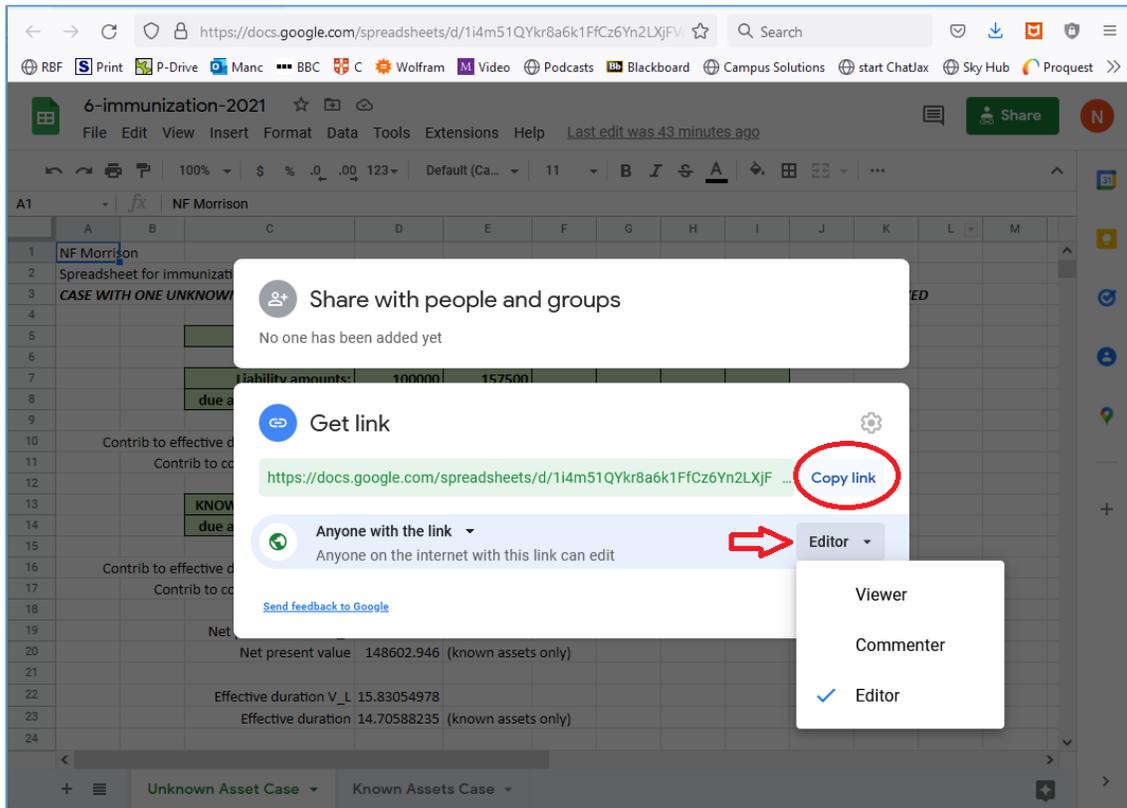
Restricted Only people added can open with this link

Change to anyone with the link

Copy link

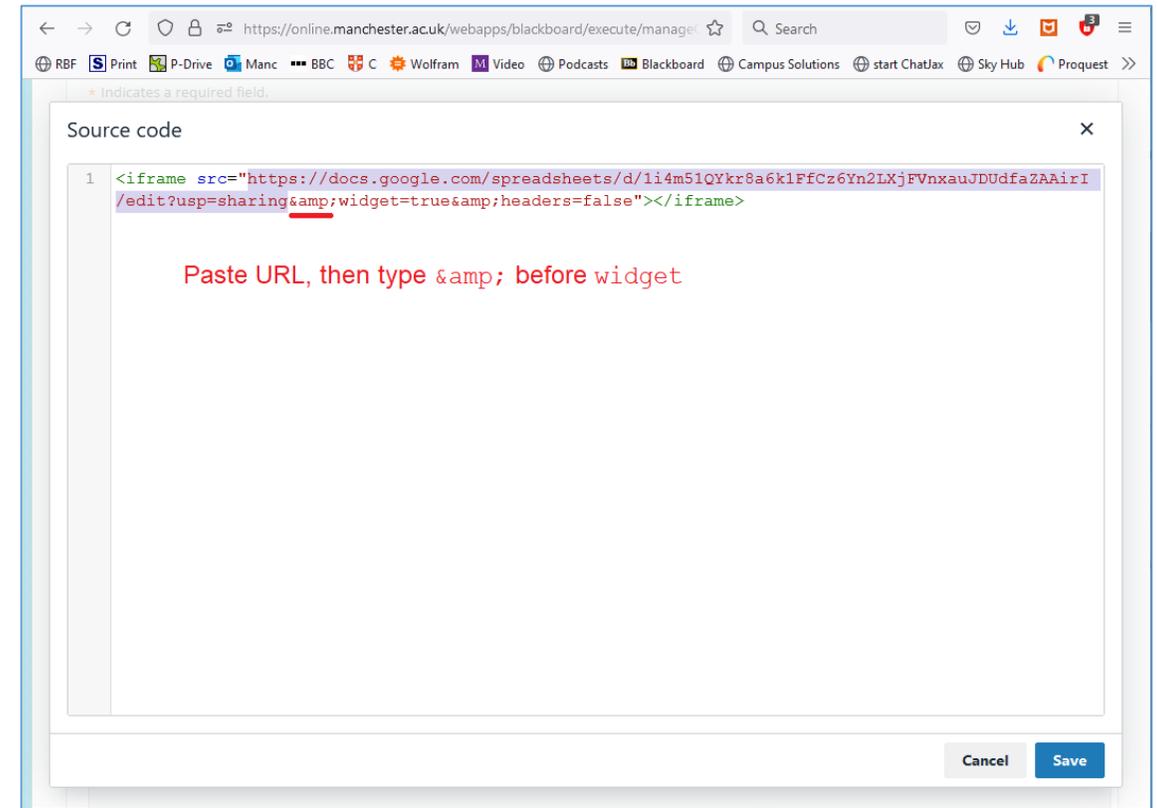
Example – Google Spreadsheet (slide 5 of 6)

9. Set viewer/editor access as desired, then click “Copy link”



The screenshot shows a Google Spreadsheet titled "6-immunization-2021" with the sharing dialog box open. The dialog box has two main sections: "Share with people and groups" and "Get link". In the "Get link" section, the URL is displayed as `https://docs.google.com/spreadsheets/d/1i4m51QYkr8a6k1FfCz6Yn2LXjF...`. The "Copy link" button is circled in red. Below the URL, there is a dropdown menu for access control, currently set to "Editor". A red arrow points to this dropdown menu, which is expanded to show options: "Viewer", "Commenter", and "Editor" (which is selected with a checkmark).

10. Paste the new URL and type & amp; before “widget”



The screenshot shows a code editor window titled "Source code" with the following HTML code:

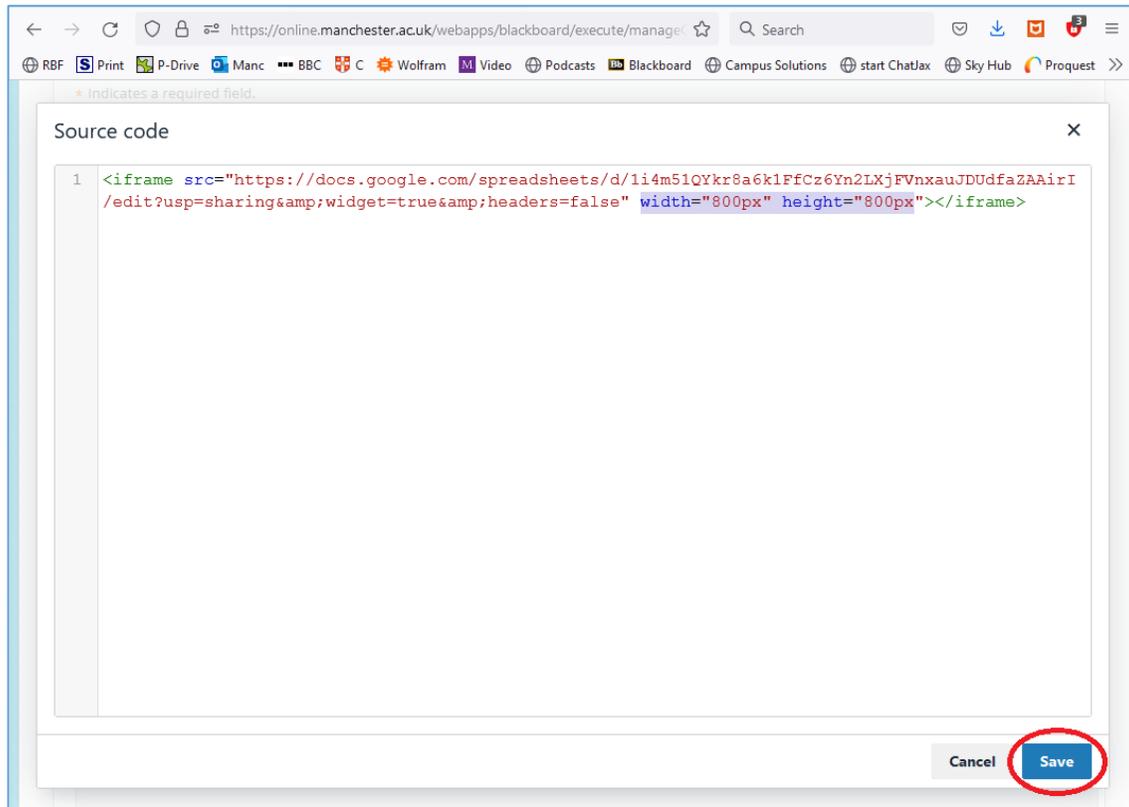
```
1 <iframe src="https://docs.google.com/spreadsheets/d/1i4m51QYkr8a6k1FfCz6Yn2LXjFVnxauJDUdfaZAAirI/edit?usp=sharing&widget=true&headers=false" ></iframe>
```

The text `&widget=true` is highlighted in red. Below the code, there is a red instruction: "Paste URL, then type & amp; before widget". At the bottom of the window, there are "Cancel" and "Save" buttons.

Note: if embedding a Google Document instead of a Sheet, paste the new URL and type & amp; before “embedded”

Example – Google Spreadsheet (slide 6 of 6)

11. Add the width & height attributes, then click Save & Submit

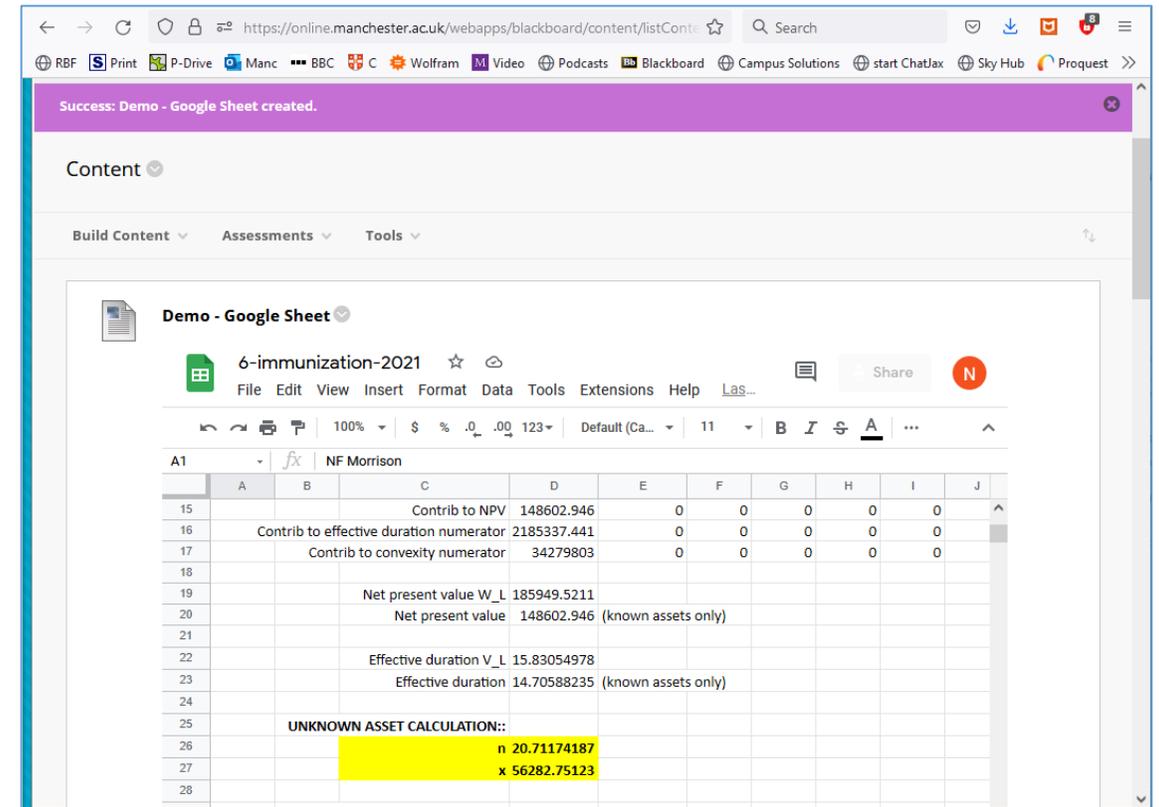


Source code

```
1 <iframe src="https://docs.google.com/spreadsheets/d/li4m51QYkr8a6k1FfCz6Yn2LXjFVnxauJDUdfaZAAirI/edit?usp=sharing&widget=true&headers=false" width="800px" height="800px"></iframe>
```

Cancel Save

12. Spreadsheet is now embedded in Blackboard



Success: Demo - Google Sheet created.

Content

Build Content Assessments Tools

Demo - Google Sheet

6-immunization-2021

File Edit View Insert Format Data Tools Extensions Help

100% \$ % .0 .00 123 Default (Ca... 11 B I A ...

A1	A	B	C	D	E	F	G	H	I	J
15			Contrib to NPV	148602.946	0	0	0	0	0	
16			Contrib to effective duration numerator	2185337.441	0	0	0	0	0	
17			Contrib to convexity numerator	34279803	0	0	0	0	0	
18										
19			Net present value W_L	185949.5211						
20			Net present value	148602.946	(known assets only)					
21										
22			Effective duration V_L	15.83054978						
23			Effective duration	14.70588235	(known assets only)					
24										
25			UNKNOWN ASSET CALCULATION::							
26			n	20.71174187						
27			x	56282.75123						
28										

Note: students can edit the spreadsheet, if you chose the “editor” option in Step 9.